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ABSTRACT

This volume of abstracts describes papers written on the following topics: (1) Strength Physiology; (2) Learning Disabilities (motor); (3) Physiology - General; (4) Work Capacity; (5) Measurement and Recreation; (6) Biomechanics; (7) Professional Preparation (physical education); (8) Muscle Performance; (9) Sociology of Sport; (10) History of Sport; (11) Motor Behavior; (12) Body Composition and Performance; (13) Motor Skill Acquisition; (14) Speed of Reaction and Response; (15) Health Education; (16) Ergometry; (17) Self Attitudes and Anxiety. The name and address of the author of each paper is included with every abstract. (JD)

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ABSTRACTS

Research Papers 1977 AAHPER Convention

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ABSTRACTS

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PREFACE

This volume of Abstracts of Research Papers 1977 includes abstracts, precisely as submitted by authors of 121 original research papers scheduled for presentation at the Seattle Convention of the American Alliance for Health, Physical Education, and Recreation, March 25-29, 1977. The papers were grouped by topic for each session, as noted in the table of contents.

The time and date for the presentation of each original research paper are indicated in the lower left-hand corner. In all cases, the name and address of the author to whom inquiries for further information may be sent appear in the lower right-hand corner. An index of all authors is presented at the conclusion of this volume.

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MYOELECTRIC FREQUENCY CHANGES DURING STATIC FORCE PRODUCTION.

Michael W. Givens, University of Illinois; Janet B. Teeple, University of Illinois.

Individuals neuromuscular adaptations to a submaximal static contraction for a period of two minutes were investigated to detect changes in the contributing frequency components of the electromyogram (EMG) recorded from surface electrodes. The rationale for observing frequency shifts lies in the theory that the control of motor output by the central nervous system is relegated to well-defined morphological and functional differences of motor units. In a mildly fatiguing task the central nervous system shifts control to motor units which contract at lower frequencies and are less fatigable. This phenomenon is exhibited by a shift to lower frequencies in the EMG spectral density function. Boys (N = 15) in the 11 to 13 year ($\bar{X}$ = 12.04) age range served as subjects. Analog EMG data were recorded on FM magnetic tape for subsequent analog-to-digital conversion and computer analysis using the techniques of spectral analysis. Electromyographic spectral density within frequency ranges served as dependent variables and treated to analysis of variance. Data analysis revealed significant shifts of the EMG spectrum to lower frequencies as fatigue progressed. These findings suggest that the frequency shift is due to the neurological phenomenon of synchronization of motor units.

Michael W. Givens
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March 25, 1977
10:45 am

ASSOCIATIONS BETWEEN SURFACE ELECTROMYOGRAMS, GIRTHS, AND STRENGTH. W. W. Hosler, University of Houston; G. W. Doyle, Northern Kentucky.

The twofold purpose of this study was to note possible associations between measures of isometric tension, girths, and surface electromyograms resulting from light, isotonic work; and from the same data, develop a regression equation which reflected lean mass of the thigh.

The subjects were 27 male and 35 female, college age volunteers. The surface electromyograms for the two isotonic loads, and thigh girths and skinfolds were all taken at the same geographic location. Strength of the quadriceps was measured with a cable tensiometer. Descriptive statistics were obtained for the experimental variables for each group, and intercorrelations among these same variables considered. Also, partial correlation procedures were utilized to control for the variance accounted for by subcutaneous fat for each group. These conclusions were made:

1. There was an intercorrelation between thigh lean mass and knee extension strength for men. This was not true for women.
2. There was an intercorrelation between surface electromyographs for light, isotonic loads.
3. The intercorrelations between knee extension strength and two surface electromyograms for light, isotonic loads were not significant.
4. By applying the regression equation for lean mass of the thigh to the intercorrelation matrices, it appears that the effects of sex related differences pertaining to the surface electromyogram and strength can be minimized.

This research demonstrates the concept of force-energy in human movement. Therefore, additional study is suggested using a higher percent of each subject's maximal strength to obtain the surface electromyograms.

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March 25, 1977
11:00 am

STRENGTH CHARACTERISTICS OF WOMEN ATHLETES AT SYRACUSE UNIVERSITY.
Douglas S. Garfield and Garret P. Caffrey, Syracuse University.

The specific purpose of this research study was to quantify the effects of a Nautilus resistance training program on Fall 1976 in-season women athletes at Syracuse University. The teams were Field Hockey (N=22), Tennis (N=14) and Volleyball (N=16). Each subject was pre-season evaluated to quantify muscular strength. Employing this data, matched pairs for each team were developed and randomly assigned to either the experimental (N=26) or control groups (N=26). The experimental group trained twice weekly for 7 weeks as well as participating with their respective in-season teams. The control group did not strength train but did participate with their respective in-season teams. The variables assessed both before and after the training time period were shoulder, hip, and ankle planter flexion via cable tensiometers, the bench, overhead and leg press on a Universal Gym Centurion model, handgrip strength and vertical jump. Before the training time period began there were no significant differences between the experimental and control groups on the variables assessed. However, after the training time period, statistically significant differences between the experimental and control groups resulted for all variables except leg press, hand grip strength and vertical jump. When pre- and post-training time period variables were compared for the control group, there was a significant decrease in overall body strength as measured by the cable tensiometer, a significant increase in hand grip strength, with the remaining variables exhibiting no significant change. When pre- and post-training assessments were compared for the experimental group all variables improved significantly.

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March 25, 1977
11:15 am

COMPARATIVE ANALYSIS OF SPEED, STRENGTH, AND BODY SIZE IN POWER MOVEMENTS. Lynn W. McCraw, University of Texas at Austin.

The relative influence of speed and strength in power movements and the effect on these relationships when controlling weight, heights, and leg length was determined for 49 college men. The aircraft cable tensiometer was used to measure the strength of muscles involved in extending the legs with subject in leg press position on a Universal Gym and positioned with a 90-degree angle at knee joint. The average of two trials was used as the score. A 100-second electric timer was used to measure speed in extending the legs against a resistance equal to one's body weight. Subjects were seated in same position as for the strength test, and the score was the average of the middle two of four trials. Two tests were used for power movements. One was the jump and reach test and the other was a modification of the stair climb as proposed by Margaria. In the latter test, the subject started at his own command from bottom of the stairs and climbed 12 steps, taking two steps at a time. Measurements were taken with a 100-second electric timer at the 4th, 8th and 12th steps. The score was the average of the middle two of four trials. Pearson product-moment correlations were computed to check the reliability of tests and to determine the relationship among variables, and partial correlations were used to ascertain the effect of weight, height, and leg length. The results are summarized as follows: (1) Reliability coefficients ranged from .90 to .98, (2) Correlations between strength and power were .22 for jump and reach and -.03, .02, and .03 for stair climb. This relationship was increased substantially with weight controlled, (3) Correlations between speed and power ranged from .45 to .69 with considerable decrease when weight, height, and leg length were controlled, (4) Only moderate correlations of .30, .35, and .43 were found between the jump and reach and the stair climb test. Results of this and similar studies indicate that definite conclusions cannot be drawn relative to the strength-speed-power relationship. An examination of seven studies comparing strength with the jump and reach reveals correlations ranging from .40 to .70 in four and from .20 to .30 in three. The correlations between speed and power are higher than those found in other studies, but this is no doubt due to the fact that in this study the muscles contracted against a load equal to body weight, whereas in other studies the load was only the part being moved.

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March 25, 1977
11:30 am

MUSCULAR TORQUES AND JOINT FORCES DURING PERFORMANCE OF THE PARALLEL SQUAT BY CHAMPION POWERLIFTERS. Thomas M. McLaughlin, Thomas J. Lardner, Charles J. Dillman, University of Illinois at Urbana-Champaign.

This study was undertaken to determine the kinetic factors that influence performance in the parallel squat, with particular emphasis on the common area of difficulty, or "sticking point", that was reported by McLaughlin, Dillman, and Lardner[1] (1976). Twelve Ss from among the competitors in the U.S. Senior National A.A.U. Powerlifting Championships were selected for analysis. High speed cinematography was utilized to obtain continuous measurements of joint and bar centers during the motion. These data were treated with a cubic spline analysis technique (McLaughlin, Dillman and Lardner, 1976)[2] and were input along with subsequent time derivatives and anthropometric measures into appropriate equations of motion. A specially designed computer program gave as output vertical and horizontal joint forces and muscular torques for the shank, thigh, and trunk. Results indicated that high-skilled Ss minimized trunk torques (extensor dominant - to 705 Nm) by maintaining more erect trunk positions. High-skilled Ss also demonstrated more extensor dominant thigh torques (to 500 Nm) than the less skilled Ss. The most intriguing result of the study, however, was that at the "sticking point" area (thigh angle $\approx$ 30 degrees) thigh torques became more flexor dominant, shank torques more extensor dominant, and total vertical joint force at the ankle dropped below the equilibrium level. These data, in conjunction with the kinematic results, point to the role of the two-joint muscles of the leg. It appears that the "sticking point" area is a transition period for two-joint muscle action during the parallel squat. Since champion powerlifters who failed in the parallel squat often did so near this position, these findings indicate important implications for this and other sport activities.

[1,2] Unpublished Research Reports, Biomechanics Research Laboratory, University of Illinois at Urbana-Champaign, 1976.

Thomas M. McLaughlin
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March 25, 1977
11:45 am

VARIABLE RESISTANCE VERSUS CONSTANT RESISTANCE STRENGTH TRAINING IN ADULT MALES. Thomas V. Pipes Department of Human Movement, Dominican College.

This study was designed to compare the differences in strength, body composition and anthropometric measures between groups trained with variable and constant resistance training procedures. Thirty-six male volunteers were randomly assigned to one of three groups: constant resistance, variable resistance and control. Strength training was conducted 3 days per week, approximately 45 minutes per session for 10 weeks. Measurements of strength, body composition and anthropometric data were taken before and after the 10 week training period. Using ANOVA in conjunction with the Scheffe' procedure, it was found that the group trained with constant resistance procedures had significantly greater increases in strength than the variable resistance group when assessed with constant resistance testing procedures. Conversely, it was found that the group trained with variable resistance procedures exhibited significantly greater increases in strength than the constant resistance group when assessed by variable resistance testing procedures. Findings on body composition and anthropometric data suggest that while both the constant and variable resistance groups exhibited significant changes in lean body weight and body fat, neither group was significantly better than the other for effecting these changes. The specificity of training doctrine suggests that testing in a mode that is similar to the mode trained at will yield significant increases. While both training groups yielded significant results in strength, the magnitude of this increase was dependant upon the mode in which one trained and subsequently the mode in which one was tested. The specificity of training doctrine was supported in this study. These findings suggest that this concept is a very important factor when assessing human strength training programs.

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March 25, 1977
12:00 pm

THE EFFECTS OF REPEATED TRIALS ON THE RELIABILITY OF PERCEPTUAL-MOTOR PERFORMANCE SCORES OF INSTITUTIONAL MENTALLY RETARDED SUBJECTS. Dr. Peter M. Aufsesser, Coordinator, Adapted Physical Education, San Diego State University, San Diego, CA 92182

The study attempted to determine the effects of repeated trials on the perceptual-motor performance scores of twelve to twenty year old institutional mentally retarded boys and girls (N=36). Subjects were tested one day a week for five consecutive weeks on the perceptual-motor criterion tests. These perceptual-motor items were balance beam, stork stand, ball throw, ball tracking side-step, and over and under test. The analysis was conducted through the use of Dayton's repeated measures program. A one dimensional repeated measures design was used on the scores of the entire sample in order to determine if any significant differences existed between the scores on the five trials. In all cases where the assumptions of the repeated measures design were not met, a multivariate analysis of variance program was used. On the perceptual-motor items significant differences were found between trial scores on the stork stand, ball throw, and over and under items. Based on the results of the analysis, the nature of the institution, and observation of its program, the following statements are made. Institutional mentally retarded individuals are capable of improving their motor ability if provided with the opportunities to learn. The significant differences on the stork stand, ball throw and over and under items may be attributed to the lack of previous experience on these type items. Conversely, the lack of significance on the balance beam, ball tracking and side step items may be attributed to environmental factors related to the nature of this institution's program. These factors should be considered when determining assessment criterion tasks and specifically whether multiple trials are needed.

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March 25, 1977
1:30 pm

ABSTRACT

COMPETENCY BASED TEACHER TRAINING IN CONDUCTING OF THE INDIVIDUALIZED EDUCATIONAL PROGRAMS FOR THE TRAINABLE MENTALLY RETARDED. David M. Auxter, Slippery Rock State College.

The purpose of this study was to determine the effects of two training procedures on selected competencies related to the implementation of an "Individualized Educational Program." The selected variables of instruction explored were: 1) planning and management ability, 2) techniques for acquiring present levels of educational performance, 3) application of learning principles for pupil acquisition of "short-term instructional objectives," 4) procedures for conduction of the "Individualized Educational Program," and 5) the learning gains of handicapped children. Twelve subjects were randomly assigned to each group and instructors were randomly assigned on a one-to-one basis to each child. Data by check lists of criterion for each sub-competencies of the 4 generic competencies cited above was collected on each "teacher in training" over nine 20-minute time periods. The twelve subjects were divided into two groups of 6. Both groups of teachers-in-training went through competency based training which included the following steps: 1) read materials, 2) pre-test on comprehension of materials, 3) lecture demonstration to amplify materials, 4) cognitive post test on lecture demonstration to mastery of materials, 5) practice the implementation of skills on a one-to-one basis with Trainable Mentally Retarded Children in a clinic with handicapped children. However, one group was provided with a question and answer session after the post test to clarify prevailing questions while a second group was provided with a simulation competency based experience to a criterion mastery level and immediate feedback to errors during implementation at the clinical site instead of the question and answer session discussion. The results of the study indicated there was no significant difference on the results of training procedure for planning or management competencies. However, there were significant differences between groups in favor of the simulation-immediate feedback group in determining present levels of educational performance, application of learning principles, and the learning gain in sequential learned programming by handicapped children. The data suggests, that certain teacher competencies of the training program need differential types of training and that if one component aspect of the instructional system is deficient the effects of the learning outcome of children may be affected.

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March 25, 1977
1:45 pm

EFFECTS OF VARIOUS EXERCISE STIMULI ON ACTIVITY LEVEL AND LEARNING BY HIGH AND LOW ACTIVE RETARDED CHILDREN. William C. Chasey, Carol G. Chasey, The George Washington University.

Very high rates of motor activity, as well as very low rates, are observed more frequently in mentally retarded populations than in non-retarded populations. High activity students often are unable to maintain attention to task-relevent conditions, which increases their probability of failure in learning situations. Many theorists emphasize the importance of a stimulation-free learning environment for highly active retarded children, while others stress the need for increased stimuli. Our own data-induced position was that overactivity may be itself a constant search for additional stimulation, with overactive children chronically below their individual optimal levels of stimulation. If overactive children are relieved of their constant search for additional stimulation by having that stimulation provided, it is possible that their activity rates will decrease and also that they will be able to concentrate increased attention on a task; thus, they may be able to learn more efficiently. The influence of various exercise stimuli on activity levels and learning by retarded children has not been fully investigated, and educators are confused when dealing with physical education programs for this population. How will these programs influence regular classroom learning situations and will students be better able to learn? Two questions were asked in this study: (a) Are there activity-reducing effects of various exercise stimuli with high and low active retarded children?; (b) If various exercise stimuli can reduce activity rates, will that circumstance also lead to increased learning efficiency? In this study the effects that three different levels of exercise have on learning and activity levels of institutionalized retarded children were investigated. To obtain data on these questions, retarded children were presented two learning tasks after three levels of exercise. The data from this investigation supported the hypothesized relationship between exercise and learning for high active retarded children.

This investigation was supported by Research Grant #G00443CH60306 from the United States Office of Education, Bureau of Education for the Handicapped.

William C. Chasey
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March 25, 1977
2:00 pm

THE EFFECTS OF PERCEPTUAL-MOTOR TRAINING AND MUSIC ON PERCEPTUAL-MOTOR DEVELOPMENT AND BEHAVIOR OF EDUCABLE MENTALLY RETARDED CHILDREN. Joe M. Elrod, Auburn University At Montgomery.

The specific purposes of the study were to determine the effects of a sequential and structured perceptual-motor training program and a structured music program extending for a fifteen week period on:

1. The development of perceptual-motor skills, as measured by the Purdue Perceptual-Motor Survey.
2. General behavior as observed in classroom activities, personal health habits, physical education participation, and social adjustment.

The method of research selected for the study was the case study technique. Thirty subjects between the ages of nine and twelve were selected for the study. The subjects were divided into two groups with Group I participating in both perceptual-motor and music activities and Group II participating in music activities only.

Case studies were written to describe each subject's experiences in the respective programs. Sources of data were background information including family history, psychological data, medical history, and educational history; an evaluation of perceptual-motor attributes (previous and post) using the Purdue Perceptual-Motor Survey; a Teacher Rating Scale evaluating each subject's social and emotional behavior in classroom activities, personal health habits, physical education participation, and social development; and daily anecdotal records which included perceptual-motor and music activities participated in, time involved in each activity, level of achievement, and social behavior.

Within the limitations of this study the following conclusions were drawn:

1. Combined perceptual-motor and music programs will improve perceptual-motor skills of educable mentally retarded children measurably.
2. Combined perceptual-motor and music programs will develop perceptual-motor skills to a much greater extent than a music program alone.
3. Similar gains were made in social and emotional behavior by subjects in both groups. Therefore, it was concluded that structured and meaningful group activity of various types may improve behavior of educable mentally retarded subjects.
4. Improvement in physical skills appears to enhance an improved self-concept.

Joe M. Elrod, Dept. of Phys. Ed.
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March 25, 1977
2:15 pm

THE COMPARATIVE EFFECTS OF A PERCEPTUAL-MOTOR PROGRAM AND A MODIFIED TRADITIONAL PROGRAM UPON THE GROSS MOTOR DEVELOPMENT OF CHILDREN WITH LEARNING DISABILITIES. Robert E. Kraft, University of Delaware.

It was the purpose of this investigation to compare gross motor development in children when exposed to varying methods of instruction. A gross motor development test was administered to 92 six and seven year old children all enrolled in a learning disability program. Based upon the pre-test, the children were randomly assigned to one of two programs, namely: (1) a perceptual-motor porgram and (2) a modified traditional physical education program. All subjects were evaluated in gross motor abilities following the 16 week developmental programs.

The evaluation instrument consisted of 12 gross motor categories: (1) body image, (2) directionality, (3) dominant static balance, (4) non-dominant static balance, (5) forward dynamic balance, (6) backward dynamic balance, (7) lateral dynamic balance, (8) side crossover dynamic balance, (9) locomotor abilities, (10) symmetrical coordination, (11) eye-hand coordination, and (12) eye-foot coordination.

The perceptual-motor program was designed to emphasize directionality, static and dynamic balance, spatial abilities, coordination, and kinesthesis. The modified traditional program stressed individualized instruction through rhythms, self-testing activities, and low-organized games.

Test scores were evaluated by correlated t tests and one-way analysis of variance. Results of analysis revealed the following findings:

1. There were significant differences between the two groups when comparing specific test items. The perceptual-motor group achieved greater scores in the following: (1) backward dynamic balance at the .01 level and (2) side crossover dynamic balance at the .05 level.
2. Results were non-significant when comparing total group scores. Thus, a perceptual-motor program and a modified traditional program were equally effective when assessing overall gross motor development.
3. Each group made significant gains from pre- to post-test on varied test items. The perceptual-motor group improved in all four dynamic balance categories, locomotor skills, and symmetrical coordination. The modified traditional group improved in body image, forward dynamic balance, and side crossover dynamic balance.

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March 25, 1977
2:30 pm

DEVELOPMENT OF AN OBSERVATIONAL INSTRUMENT TO ASSESS SELECTED FUNDAMENTAL MOVEMENT PATTERNS OF LOW MOTOR FUNCTIONING CHILDREN. Bruce A. McClenaghan, University of South Carolina

The purpose of this study was to develop an instrument that could assess the qualitative aspects of selected fundamental movement patterns of low motor functioning children. Literature on the progressive development of each of the selected movement patterns was reviewed and summarized. From this review a developmental progression of each pattern was identified and divided into three developmental stages and three specific body actions. Content validity was obtained on the instrument and interrater reliability of the instrument was determined utilizing 20 assessors evaluating a previously scored 16 mm film. The subjects' performance reliability was calculated utilizing 20 children who were filmed twice, each on a different day, performing the selected movement patterns. Each film was assessed by a graduate student, in physical education who was totally familiar with the instrument. A percentage of consistency measure was calculated from the difference in the subjects' performances.

It was concluded on the results of this study that:

1. It was possible to design and develop an instrument to assess the qualitative aspects of fundamental movement in children of low motor ability.
2. The instrument had content validity within the limitations of the study.
3. As a result of the percentage of agreement, it was concluded that the instrument could be utilized as an informal evaluative tool.
4. Children were able to perform the selected fundamental movement patterns consistently on different days.
5. It appears to be easier to observe the movement patterns of catching, kicking, and jumping than the patterns of throwing and running.

Further research needs to be conducted upon the progressive development of selected movement patterns of children during early childhood so this information may be utilized in designing appropriate physical activities for the child of low motor ability.

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March 25, 1977
2:45 pm

THE EFFECTIVENESS OF SELECTED PHYSICAL EDUCATION ACTIVITIES IN TEACHING GEOMETRIC CONCEPTS TO TRAINABLE MENTALLY RETARDED CHILDREN

Kenneth D. Mosely
South Carolina State College

The purpose of this study was to determine the influence of selected physical education activities emphasizing balance on geometric concept test scores of trainable mentally retarded children. Twenty-eight subjects were assigned randomly to the experimental group and 27 children to the control group. Both groups were administered a 24 item (8 items each for circle, square, and triangle) geometric concept test (pretest). For a 10 week period the experimental group received instruction in physical education activities that emphasized balance. In addition, these activities were designed to enhance geometric concept scores. The control group received instruction in physical education activities that emphasized balance, but the lessons were not planned to enhance geometric concept scores. Both groups received classroom instruction in understanding geometric concepts. After the 10 weeks experimental period the two groups were administered the geometric concept test (posttest). Regression analysis was utilized to determine whether differences existed between the children in the groups for geometric concept test scores. Post-hoc analyses were conducted to answer the following: (1) did the older children achieve higher scores than the younger children and (2) did the test scores achieved for the circle relate to test scores achieved for the square and/or triangle? Results of the study indicated that the difference in mean scores for the square, triangle and geometric concept, between the children in the two groups was not statistically significant at the 0.25 level, however, the mean circle concept score of the experimental group was significantly larger than the mean score of the control group at the 0.25 level. The older children (84-107 months) also achieved higher mean scores than the younger children (60-83 months) in both groups for circle, square, triangle and total geometric concepts, and a relationship of practical importance existed for the children in both groups among the test scores achieved for the circle, square, and triangle concept. It was concluded that selected physical education activities which emphasized balance skills do not hinder trainable mentally retarded children's geometric concept scores. The results from the study also suggest that physical education activities cannot significantly improve cognitive learning over that which children receive in the classroom. After reviewing the results of the study, classroom teachers and physical educators may want to review studies that utilized physical education activities to enhance cognitive learning so that they can determine if there is any benefit for using similar teaching methodology with their students. Researchers may want to insure that older trainable mentally retarded children (84-107 months) are not evaluated together on cognitive tests with younger trainable mentally retarded children (60-83 months). It is also suggested that evaluative procedures which reveal "intermediate improvement" should also be utilized to assess the learning improvement of trainable mentally retarded children.

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March 25, 1977
3:00 pm

A LONG TERM ANALYSIS OF AN INDIVIDUALIZED PHYSICAL ACTIVITY PROGRAM FOR THE MENTALLY RETARDED. Robert L. Wiegand, West Virginia University.

The purpose of this study was to descriptively analyze an ongoing Individually Prescribed Instructional (IPI) program in adapted physical education. A long term observation was made relevant to the relationship between the success of IPI participation and selected student characteristics. To achieve this purpose, twenty-eight mentally retarded subjects, nine to seventeen years old, were observed for thirty weeks in an ongoing, individualized physical activity class. Rates of movement through fourteen IPI activity programs, which were employed during the class, were determined for each subject. This accomplished by dividing the number of program activities completed to criterion by each subject in each program by the number of class periods that subject participated in that program. The subsequent rate measures thus represented the number of program activities gained per class period in each program. An average of the fourteen rate measures was also computed for each subject representing an individual's mean rate of movement through all programs. The rate measures were then correlated with several selected subject characteristics (age, sex, I.Q., race). This was done to determine if any relationship existed between successful movement through the IPI programs and the selected subject characteristics. If IPI is successfully employed as an instructional methodology within the non-catagorical classroom, these correlations need be low, i.e., each subject was moved at an individual rate regardless of any classification. Of the sixty correlations completed (fifteen rate measures by four characteristics), only three proved to be significant ($p < .05$). As even these were relatively low (the highest being .50); the predictability of these parameters can be seriously questioned. The lack of relationship speaks strongly for the IPI system's applicability for educating atypical children. The results presented can readily be interpreted as indicating that movement within the IPI activity programs occurred at individual rates regardless of student classification. This type of individualization is necessary for the non-catagorical class approach to be successfully implemented. Thus it may be concluded that IPI involving physical activity is an applicable methodology to be employed in the non-catagorical classroom.

Joseph Donnelly
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March 25, 1977
3:15 pm

STRENUOUS TRAINING OF TEENAGE FEMALE DISTANCE RUNNERS: AN APPARENT DILEMMA. Florence Brush, S. U. N. Y., College at Cortland; Edmund J. Burke, Ithaca College; Donald Maron, M.D., Ithaca.

The purpose of this paper is to report on an apparent dilemma in the training of 13 teenage female distance runners ($\bar{X}$ age = 17.2 years). Their typical training schedule, usually consisting of running 50 miles per week with at least two days/week of interval training, will be described. Evidence of the success of the training procedures includes: (1) their two consecutive (1974-1975) National AAU Junior Cross-Country Championships (2) their $\bar{X}$ mile run time of 5:10 and (3) their $\bar{X}$ $\dot{V}O_2$ max of 63 ml/kg. min. Anthropometric measures included for presentation in the present study are selected skinfold measures, segment lengths circumferences, bony diameters and predictions of body density. The means indicate that these young women are shorter, lighter, lower in percent body fat, have a greater component of ectomorphy and relatively longer lower legs than non-athletic young women in the literature. Furthermore, they have a smaller overall skeletal framework than non-athletes or distance runners in the literature with the exception of the diameter of their knees and ankles possibly reflecting the stress of running. At the time of these measurements the subjects had been in training for approximately two years. At the end of three years of training only three runners had escaped serious orthopedic injuries with the most common problem being a stress fracture of the tibia. X-ray evidence is presented confirming these abnormalities. It is suggested that training of this duration and intensity in females prior to epiphyseal closure is imprudent and a possible danger to the individual's health.

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March 25, 1977
1:30 pm

THE EFFECT OF PARTICIPATION IN BASKETBALL, SWIMMING, AND PHYSICAL CONDITIONING CLASSES ON THE BODY COMPOSITION OF COLLEGE WOMEN. Cheryl J. Cohen, Purdue University; and Daria Harry, Miami University.

It was the purpose of this study to determine the extent to which selected measures of body composition would be altered through participation in 3 selected physical activity classes. A total of 80 undergraduate women were studied, 20 for each activity, plus a control group of like number. Measurement of potassium-40 plus selected anthropometric measurements were used to determine body composition. Statistical analysis of the collected data yielded the following results: 1) all 3 activity groups significantly altered their body composition during the course of participation in activity classes, when compared with the control group; 2) within the basketball group, % body fat decreased ($P < .01$), some measures of girth increased ($P < .05$), and weight was unchanged; 3) the swimming group showed similar changes; 4) within the conditioning group, no significant changes were made in any of the measures utilized in this study.

From these data it was concluded that students enrolled in physical activity (i.e. sports skills) classes can make as great or greater changes in their body composition than if they enrolled in physical conditioning classes (recognizing the other benefits to participating in such a class).

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March 25, 1977
1:45 pm

THE EFFECTS OF SPRINT-ASSISTED TRAINING UPON THE SPRINTING SPEED OF MALE COLLEGIATE TRACK AND FIELD ATHLETES. Jan E. Johnson and Victoria A. LeFevers, Southern Illinois University, Carbondale.

The purpose of the study was to determine if sprint-assisted training, when used as a partial replacement for some of the conventional methods of training, would affect the sprinting speed of highly trained male collegiate track and field athletes. Experimental and control groups were determined by means of a cluster sampling according to the specialty of each subject. The subjects were pretested upon the 60-yard dash with a running start, and the groups were found to be homogeneous by a t-test for paired samples. The subjects then embarked upon a treatment period of six weeks, wherein the experimental group was sprint-assisted two days per week, performing a total of six 100-yard sprints with the assistance of an automobile moving at speeds specific to their abilities. Meanwhile, the control group ran the same number of 100-yard sprints without sprint-assistance. Upon completion of this portion of their workout, the subjects were allowed to return to their normal training routines as members of the men's varsity track and field team at SIU-C.

The subjects were retested upon the 60-yard dash with a running start after three weeks and after six weeks of treatment. Analysis by a t-test showed the experimental group experienced a significant increase ($p=.01$) in speed from the pretest to the final posttest, while the increase of the control group was not significant ($p=.097$). An analysis of covariance with repeated measures showed the experimental group was significantly faster than the control group ($p=.003$); the posttest scores were significantly faster than the pretest scores ($p=.00$); the linear effect showed the experimental group was improving significantly faster than the control group ($p=.001$); and the significant quadratic effect indicated the groups were improving at a decreasing rate at the end of the six weeks treatment period ($p=.033$).

It was concluded that the experimental group improved more than the control group over the six weeks training period as a result of the treatment; the experimental group improved faster than the control group; the experimental treatment of six repetitions per day, two days per week, was sufficient to cause significant improvement in sprinting speed.

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March 25, 1977
2:00 pm

THE EFFECTS OF A STATIC EXERCISE PROGRAM UPON SPECIFIC JOINT MOBILITIES IN HEALTHY FEMALE SENIOR CITIZENS. Melinda M. Kriete, Springfield College.

The specific objective involved in this study was to determine if differences existed in the range of motion in specfic joints of healthy adult women in a senior citizens club who engaged in activities of daily living, or who exercised according to Lawrence Frankel's exercise methods. The Leighton Flexometer was used to measure the following active joint ranges of motion on the dominant side: shoulder flexion, shoulder abduction, hip flexion, hip abduction, elbow flexion, wrist flexion, wrist extension, ankle plantar flexion, and ankle dorsal flexion. The exercise group met twice a week for a seven week period. Thirty women served as subjects in the study: 15 experimental, 15 control. The F values computed were as follows: ankle flexion .001, wrist flexion .44, elbow flexion .14, shoulder flexion .26, shoulder abduction 1.08, hip abduction 2.65, knee flexion 5.32, and hip flexion 16.61. The table value for F was 4.23. The null hypothesis was accepted for ankle flexion and extension, wrist flexion and extension, shoulder flexion, shoulder abduction, and hip abduction. The null hypothesis was rejected for knee flexion and hip flexion. There were differences in the active joint ranges of motion scores for knee flexion and hip flexion for healthy female senior citizens exposed or not exposed to a static exercie program for seven weeks. There were no differences in the active joint ranges of motion scores for ankle flexion and extension, wrist flexion, and extension, elbow flexion, shoulder flexion, shoulder abduction, and hip abduction for healthy female senior citizens exposed or not exposed to a static exercise program for seven weeks.

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March 25, 1977
2:15 pm

^{40}K CHANGES WITH PROLONGED EXERCISE. Ben R. Londeree, Larry Forkner, University of Missouri.

The purpose of the study was to determine the effect of prolonged exercise upon liquid scintillation determinations of whole body potassium. Three subjects were counted (^{40}K) in a two-pi liquid scintillation counter prior to, within one hour after prolonged exercise, and at other times after prolonged exercise. The exercise consisted of long distance runs or graded treadmill walking. When the posttest was conducted within two hours after exercise the ^{40}K counts were always elevated over the pretest values. This was not the case on control days or following a one hour steam bath. Food or soda ingestion had little or no effect on the ^{40}K counts. A discussion of possible mechanisms for the results suggested that an interaction between exercise related plasma K concentration changes and temperature induced increases in cutaneous blood flow may result in an increased counting efficiency. It is concluded that for valid results, ^{40}K determinations should be made at least four hours after exercise.

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March 25, 1977
2:30 pm

OXYGEN EXTRACTION FROM ALVEOLAR VENTILIATION DURING SUBMAXIMAL EXERCISE AS RELATED TO MAX $\dot{V}O_2$. Peter J. Maud, Tulane University

A pulmonary function ratio describing oxygen extraction from alveolar ventilation (VO_2/V_A) obtained during steady-state, submaximal exercise and other variables were examined to assess their relationship to max $\dot{V}O_2$. These included body weight, submaximal, steady-state exercise $\dot{V}_E$ and heart rate (HR). Male subjects (N = 18, Ages 17 - 35 yrs.) who exercised on a regular basis were studied. Submaximal steady-state tests were conducted on a bicycle ergometer at 900 kpm/min for eight minutes. The maximal test started at the same power load but was increased by 90 kpm/min every minute until the subject could no longer maintain a pedalling rate of 60 rpm. An open circuit method, adapted for the determination of end-tidal CO_2, was used for gas analysis. Test data collected included F_ACO_2, F_ECO_2, $\dot{V}_E$ and HR. End tidal CO_2 was used to represent F_ACO_2. The VO_2/V_A ratio is obtained using only the three gas fractions from the following equation:

$$VO_2/V_A = [0.265(1 - F_ECO_2 - F_EO_2) - F_EO_2]/F_ECO_2/F_ACO_2)$$

A multiple linear regression technique was employed to relate max $\dot{V}O_2$ to the VO_2/V_A ratio and the other variables. Correlations between max $\dot{V}O_2$ and the other variables were: VO_2/V_A, r = 0.54, body weight, r = 0.53, $\dot{V}_E$, r = 0.43, and HR, r = 0.35. A derived prediction equation utilizing the VO_2/V_A ratio and body weight which gives a multiple R of 0.68 is:

$$\text{Max } \dot{V}O_2 = 1.452 + 24.35\ (VO_2/V_A) + [15.72\ (\text{wt. in kg})]10^{-3}$$

Inclusion of $\dot{V}_E$ and HR in the multiple correlation did not result in a significant increase in the value of R. The correlation between the submaximal exercise VO_2/V_A ratio and max $\dot{V}O_2$ was statistically significant and the ratio correlated better with max $\dot{V}O_2$ than any of the other variables, including HR. Predictive instruments utilizing submaximal HR are sensitive to a number of variables unrelated to exercise and, therefore, it would seem justified to devise a different instrument which employs physiological measurement less responsive to autonomic nervous activity. The VO_2/V_A ratio would appear to satisfy these requirements but the multiple R = 0.68 is weak.

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March 25, 1977
2:45 pm

THE STRESS OF COACHING. William B. McCafferty, University of Redlands; Jeffrey A. Gliner and Steven M. Horvath, University of California, Santa Barbara.

Previous investigations concerning the psychophysiological stress of coaching have indicated considerable stress on coaches during competition. Coaches of major sports such as football and basketball have been observed to have heart rate responses high enough to suggest possible stress on their cardiovascular system. The current study indicates that coaches of "minor" sports are also susceptible to the stress of competition. Measurement of heart rates of volleyball, water polo, swimming, and cross country coaches were determined every minute during competition in order to evaluate this stress. The increased heart rates of these coaches during competition, often 100 beats per minute above resting values, suggest that the stress of coaching is not restricted to the "major" sports, but that any sport, individual or team, imposes stress on the coach during the competition. The response is also individual, with some coaches exhibiting a greater stress response than others.

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March 25, 1977
3:00 pm

HEART RATE RESPONSES DURING A 5.2 MILE CROSS-COUNTRY RACE.

Alfred F. Morris, Charles Dotson, Paul Davis and D. Laine Santa Maria, Department of Physical Education, University of Maryland.

Introduction. Heart rate (HR) has been shown to be a reliable indicator of total body stress during vigorous exercise. However, except under certain artificial laboratory situations it is impossible to record HR during severe exercise stress unless certain equipment is available. We wanted to monitor HR responses of runners during actual cross-country competition. By wearing a new light weight (<1.2kg) Electrocardiorecorder which is very compact (17cm X 9.5cm X 6cm) and portable a runner may have his ECG and HR recorded for the entire warmup, race and warm-down period. Purpose. It was the purpose of this study to monitor ECG and HR responses of collegiate cross country runners during an actual race of 5.2 miles. Procedure. Two male collegiate runners consented to participate in an actual cross country race of 5.2 miles while wearing the ECG recorder noted above. A five-lead standard ECG recording procedure was used and results fed to the minature recorder for later readout and analysis. The recorder was strapped to the subjects (Ss) about one hour before the race. The recorder was checked periodically during the pre-race warmup period to make certain that it was comfortably seated in the small of the Ss' back. In addition, electrode attachment was also checked during this period and immediately prior to the start of the race. The Ss then raced with this device and also wore the recorder for a ½ hour warm-down period after his race. Results indicated that HR rose to 80% of maximum during the initial 30 seconds of the race which was over a flat portion of the course. Within the first 40 to 120 seconds HR reached 90% of maximum and remained high throughout the remainder of the 27 minute effort. This HR intensity was maintained for about 23-24 minutes. There were three short dips in the HR response each lasting about 20 to 40 seconds where HR fell to below 83% of maximum. These corresponded to several downhill respites on the course. It was also noted that HR responses reached 88% of maximum during the warmup period and quickly subsided to about 55% of maximum within 2.5 minutes post-race. Conclusion. From these initial case study findings, it seems feasible that HR responses may be studied during maximal running efforts of about ½ hour duration of cross country men over a hilly 5.2 mile course.

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March 25, 1977
3:15 pm

ACCURACY OF ANTHROPOMETRIC PREDICTION OF PERCENT BODY FAT DERIVED FROM BODY DENSITY, LEAN BODY WEIGHT, AND TOTAL BODY VOLUME REGRESSION EQUATIONS. Andrew S. Jackson, University of Houston, Houston, TX, and Michael L. Pollock, Institute for Aerobics Research, Dallas, Tx.

This study was designed to determine the accuracy of Percent Fat (%F) estimates derived from regression equations with functions of predicting body density (BD), lean body weight (LBW) and total body volume (TBV) from anthropometric variables. The subjects were 95 young men who ranged in age from 18 to 22 years and were of average %F ($\bar{X}$ = 43.4 + 6.0). The hydrostatic method was used to calculate BD, LBW, and TBV. Anthropometric variables included height, weight, 7 skinfold and 11 circumference measurements. Using BD, LBW, and TBV as dependent variables, multiple regression equations were derived with the anthropometric variables. The R's ranged from 0.86 to 0.99. The equations were used to derive predicted BD, LBW, and TBV values which were transformed to %F. The correlations between hydrostatic determined and estimated %F via BD, LBW, and TBV equations were quite similar (r's = 0.85 to 0.86). This finding indicated that even though the R's were different when predicting BD, LBW, and TBV, no accuracy is gained when the predicted values are transformed to %F. Three additional samples (N = 33, N = 73, N = 62) which differed in %F ($\bar{X}$ = 5.1 + 2.9; 16.7 + 4.1; 27.1 + 3.4) were used to cross validate the regression equations. All equations grossly over estimated %F of the high %F group, but the LBW equations tended to cross validate more accurately with the two learner samples. These findings indicated that BD, LBW, and TBV equations demonstrated similar accuracy when estimating % Fat, but the LBW equations provided the most generalized equations.

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March 25, 1977
3:30 pm

CARDIOVASCULAR DYNAMICS IN NORMAL AND HYPERTENSIVE, ENDURANCE AND RESISTANCE ATHLETES. Susan M. Dimick, Oklahoma University Health Sciences Center; Ronald A. Ratliff, University of Oklahoma; Carl J. Rubenstein, Oklahoma University Health Sciences Center.

It is well established that changes in cardiovascular dynamics occur as a result of muscular exercise, but considerable difference of opinion exists regarding the influence of different types of exercise. The external stress that may be imposed on the human body through some types of exercise may not actually alter the work of the heart itself or enhance conditioning of the cardiovascular system. These data suggest that some types of training may increase the heart's workload and cause possible harmful effects. Peak rate of change of velocity of blood flow and blood pressure-heart rate responses were monitored during dynamic and isometric exercise in 15 distance runners and 15 weightlifters. Both groups of athletes were monitored during dynamic and isometric exercise in 15 distance runners and 15 weightlifters. Both groups of athletes were subdivided into normals and those symptomatic or predisposed to hypertension. Interpretation of the data supports the possibility that resistance training may induce states of hypertension, and that endurance training may prevent or prolong the onset of the disease state. Measurements of blood velocity and pressure responses indicate elevated peripheral vascular resistance in many athletes, as well as a decreased mechanical efficiency of the myocardium in response to static and dynamic stress. This was also true in athletes with no family history of hypertension. Most of the endurance athletes were not symptomatic at rest or during exercise despite genetic predisposition to high blood pressure. Both groups of athletes with pre-disposition to hypertension had different responses to stress than normals, even though resting values may not have indicated this. These results further imply that athletes pre-disposed to disease states are in fact different than normals, but the chronic adaptations are dependent upon the type of training pursued.

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March 25, 1977
4:00 pm

THE RELATIONSHIP BETWEEN SELECTED PHYSICAL PERFORMANCE VARIABLES AND FIREFIGHTING ABILITY AMONG PROFESSIONAL FIREFIGHTERS. C. O. Dotson, D. L. Santa Maria, P. O. Davis, University of Maryland, R. Schwartz, Arlington National Orthopedic Hospital.

The purpose of this study was to determine the relationship between selected physiological, anthropometrical, and muscular strength, endurance, and power variables and firefighting ability among professional firefighters. Twenty-six physical performance variables were assessed on 100 professional firefighters and correlate against timed measures of five sequentially performed firefighting tasks and fractionated heart rates collected during performance of the firefighting tasks via holter monitering of the EKG. The simulated tasks included extending a 50 foot ladder section, carrying a 50 foot section of 2½ inch hose to the fifth floor of the tower (stand pipe carry), advancing a 50 foot section of 2½ inch hose to the fifth floor via pulley, simulating a rescue by carrying/dragging a 117 lb dummy from the fifth floor to ground level, and simulating forceable entry to a building by chopping. The five tasks were completed while wearing full turnout gear and self-contained breathing apparatus.

RESULTS: Canonical correlation analysis revealed two factors underlying the fractionated timed and heart rate data were isolated for the simulated firefighting tasks. The first factor, weighted heavily by the average inter-task heart rate ($r=.937$) and approximately equal weights for the five simulated tasks ($-.528 \leq r \leq -.361$) reflected the fact that relatively high muscular strength and endurance coupled with a near maximal aerobic capacity effort was required to complete the simulated tasks. The battery of physical performance variables best predicting the first factor included maximal heart rate, sit-ups, grip strength, age, and submaximal oxygen pulse ($R^2=.627$). The second factor, most heavily loaded by the simulated rescue ($r=.698$) and chopping tasks ($r=.419$), appeared to represent an ability to complete all tasks quickly by exhibiting a resistance to fatigue brought on by the demands of the earlier tasks. The battery of physical performance variables best predicting the second factor included lean body weight, maximal heart rate, final treadmill grade, age, and percent fat ($R^2=.39$).

This research was supported by a research grant from the National Fire Prevention and Control Administration Grant #76-008.

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March 25, 1977

4:15 pm

EFFECT OF THE PHYSICAL BIORHYTHM CYCLE ON THE AEROBIC POWER AND PHYSICAL WORK CAPACITY OF WOMEN GYMNASTS. Tamara L. Elliott, California State University, Sacramento; Irvin E. Faria, California State University, Sacramento.

Little research has been conducted to seek clues to reason for the seemingly inherent cyclic behavior which appears to affect athletic performance. It has long been apparent that athletes are subject to subtle changes in day-to-day ability to perform. It would be helpful to coaches and athletes to be aware of those factors which do and do not influence tendencies toward higher or lower capabilities on certain days. Such insight would allow for more scientific planning for both training and competition. To what extent the physical biorhythm cycle might effect performance needs to be amplified. The purpose of this investigation was to determine the effect of the physical biorhythm cycle on aerobic power ($\dot{V}O_2$ max) and physical work capacity (PWC_{180}). Eight intercollegiate women gymnasts performed two $\dot{V}O_2$ max treadmill tests at their highest, lowest, and critical day of the 23-day physical biorhythm cycle. Data from the double blind experimental design was subjected to a single factor analysis of variance with repeated measures. Statistical analysis revealed a nonsignificance ($P < 0.05$) and high correlation between the high, critical, and low subject position for $\dot{V}O_2$ max and PWC_{180}. These data suggest that the physical phase of the biorhythm cycle does not significantly influence aerobic power or physical work capacity as implied by the biorhythm theory.

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March 25, 1977
4:30 pm

Differential Effects of Warm-up and Cold Showers on Heart Rate and Oxygen Uptake During Submaximal, Maximal, and Supramaximal Exercise. Harold B. Falls; L. Dennis Humphrey; Rhonda R. Ridinger. Southwest Missouri State University.

The purpose of the investigation was to study the effect of cold showers on circulatory and metabolic responses to exercise by comparing them with warm-up in the same group of subjects. It was hypothesized that pre-exercise cold showers would cause a downward shift in the heart rate--$\dot{V}O_2$ uptake curve, allowing the subject to reach his normal max $\dot{V}O_2$ at a lower heart rate (HR) than under control conditions. If the subject could then continue to increase his HR to its control condition maximum (thereby increasing $\dot{Q}$), he could theoretically achieve a higher max $\dot{V}O_2$. The study was conducted in two phases. In Phase I (5 male subjects), data were collected on HR and $\dot{V}_{O2}$ during six min. bouts on a bicycle ergometer at max and 50 and 75% of max exercise following three pre-exercise conditions. Pre-exercise conditions were control (rest), 5 min. warm-up at approximately 50% of the scheduled exercise workload, and 10 min. cold showers at temperatures ranging between 52 and 62° F. The warm-up was followed by 3 and the cold shower by 10 min. rest respectively. HR was recorded on a Narco Biosystems Physiograph. O_2 uptake was determined using an open circuit procedure. In Phase I, the experimental conditions caused only small variations in $\dot{V}_{O2}$ at each work level, but HR for a given $\dot{V}_{O2}$ was significantly reduced after cold showers compared with warm-up or rest ($p = .05$). This resulted in the expected downward shift in the curve. In Phase II, 6 male subjects ran on a treadmill in work bouts at speed and grade combinations estimated to require an energy expenditure 1.25 times higher than a 5 min. run at a grade and speed combination required to elicit max $\dot{V}_{O2}$. Pre-exercise conditions were the same as in Phase I of the study except that warm-up was at a speed and grade combination eliciting 80-90% of max $\dot{V}_{O2}$. Mean results for both HR and O_2 uptake showed that highest values were obtained after warm-up with lowest values being obtained after the cold shower. Also, in general, subjects were able to continue exercising for the longest periods after warm-up and for the shortest periods after the shower. The results of this study lend further support to the practice of utilizing warm-up as an ergogenic aid to maximum aerobic performance. They further indicate that pre-exercise cold showers should probably not be considered an ergogenic aid in exercise requiring maximum aerobic power.

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March 25, 1977
4:45 pm

THE EFFECT OF CIRCUIT WEIGHT TRAINING ON WORK CAPACITY, CARDIO-RESPIRATORY FUNCTION AND BODY COMPOSITION OF ADULT MEN.

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The purpose of this study was to determine the physiological changes elicited by a circuit weight training (CWT) program and compare them to changes made in a running (R) program. Subjects were randomly assigned to three groups: CWT (n=11, $\bar{X}$ age = 28.9 yrs); R (n=16, $\bar{X}$ age = 29.1 yrs); and control (n=14, $\bar{X}$ age = 30.0 yrs). CWT and R groups exercised approximately 45 minutes, 3 days/week for 20 weeks. Both groups followed a standard 15 minute warmup routine of calisthenics and stretching exercises. The CWT program consisted of 8 weight training and 2 calisthenic exercises performed in 2 sets of 15 repetitions with a minimum rest interval between exercises. Each circuit began with 2 minutes of progressive ergometry training. Training results for the CWT group indicated the following: the rest interval between exercises decreased from 30 sec to 20 sec; total time of the circuit decreased from 30 min to 23 min; exercise heart rate (HR) increased from 74% to 84% of maximum; maximum strength increased 27% for the 8 weight training exercises; average weight resistance increased from 45% to 55% of the maximum strength in each exercise; and total weight resistance per workout increased 81% (1506 to 2720 lbs/workout) in the 20 week program. The R group exercised at 90% of maximum HR for 25 to 30 min in each workout. Covariance and subsequent Newman-Keuls analyses showed that the CWT group improved significantly in the following: treadmill performance time - TMT (43 sec = 10%); maximum oxygen intake - $\dot{V}O_2$ max (1.4 ml/kg•min = 3.5%); body fat (-1.8% = 8%); total skinfold fat - TSF (-14mm = 10%); pushups (10 reps = 45%); and bench press (50 lbs = 33%) when compared to the control group. The R group showed significantly greater improvements in resting HR (-7 beats/min = 11%), step test recovery HR (-15 beats/min = 14%), TMT (3 min = 38%), $\dot{V}O_2$ max (6.3 ml/kg•min = 15%), and body fat (-2.4% = 11%) compared to both the CWT and control groups. The R group improved to a smaller extent in pushups (8 reps = 38%) and bench press (19 lbs = 13%) compared to the CWT group. It was concluded that although the CWT program elicited small but statistically significant changes in work capacity and cardio-respiratory function of adult men, the CWT program was more specific to improving strength and muscular endurance.

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March 25, 1977
5:00 pm

$\dot{V}O_2$ MAX AND HEAT TOLERANCE. E. Shvarts, Y. Shapiro, G. Ben-Baruch, and A. Lev. Heller Institute of Medical Research, Tel-Aviv University Medical School, Israel.

The purpose of this study was to determine the relationship between $\dot{V}O_2$ max and heat tolerance. Fifty healthy young men participated in the experiment. Twenty subjects were trained, twenty subjects were untrained, and ten subjects were untrained and heat-intolerant, i. e., had suffered from heat stroke during military marches. The respective mean $\dot{V}O_2$ max values were 56.1, 51.2, and 43.2 $ml/kg \cdot min^{-1}$, determined by graded exercise to exhaustion on a treadmill. All subjects underwent a work-heat test which consisted of an attempt to perform bench-stepping at a load of 40 W for 3 hr in heat (40°C DB, 30°C WB). $\dot{V}O_2$ max of the untrained subjects was tested again following eight days of heat acclimation. All trained subjects tolerated 3 hr of heat exposure and their final mean heart rate and rectal temperature were 135 beats/min and 38.5°C, respectively. Only twelve untrained subjects completed the 3-hr exposure before acclimation with final mean values of 150 beats/min and 38.9°C, respectively. All untrained subjects completed 3-hr of heat exposure after acclimation which resulted in final mean values of 120 beats/min and 38.2°C for heart rate and rectal temperature, respectively, 12 % increase in sweat rate and 9 % increase in $\dot{V}O_2$ max. Non of the heat-intolerant subjects completed the 3-hr exposure. Their final heart rate and rectal temperature were 160 beats/min and 39.5°C, respectively. There were no sweat rate differences among the 3 groups. The correlation coefficients between $\dot{V}O_2$ max and heart rate responses in heat was $r = -0.50$, and the corresponding value for rectal temperature in heat was $r = -0.55$. The results show that heat tolerance is only partially dependent upon $\dot{V}O_2$ max. Fit men tend to show better heat tolerance than unfit ones, but $\dot{V}O_2$ max accounts for only about 1/3 of the variability which determines tolerance to heat. The results also suggest that heat acclimation could be used as an effective method of physical training.

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March 25, 1977
5:15 pm

EFFECTS OF SEVERE PRIOR EXERCISE ON ASSESSMENT OF MAXIMAL OXYGEN UPTAKE. Bryant A. Stamford and Robert E. Rowland, University of Louisville.

The purpose of the present investigation was to determine effects of severe prior exercise on assessment of maximal oxygen uptake ($\dot{V}O_2max$). Five moderately fit males (50.78 ml/kg·min^{-1}) performed 14 continuous type $\dot{V}O_2max$ tests on a motor driven treadmill. A running speed of 7 mph was imposed as inclination was increased 2½% (from an initial setting of 0%) every second minute of exercise. Subjects exercised to voluntary exhaustion. The highest value obtained from two tests conducted one week apart served as a reference standard for twelve subsequent tests administered during four experimental sessions. Randomly assigned experimental sessions consisting of three tests each, and separated by 10 (tests 1,2,3), 20 (tests 4,5,6), 30 (tests 7,8,9) or 40 (tests 10,11,12) minutes were conducted at a consistent hour for each subject every fourth day. Measured variables included $\dot{V}O_2$, heart rate (HR), blood lactate concentration (HLa), core (rectal) temperature (T_c) and performance time in seconds. It was found that VO_2max and performance time data obtained from tests 1,4,7, and 10 (each preceeded by abstention from exercise) were in perfect agreement with the reference standard. $\dot{V}O_2max$ and performance time data from test 3 were significantly ($P < .05$) reduced when compared with the reference standard. All remaining tests demonstrated $\dot{V}O_2max$ values not significantly different from standard reference testing in spite of significantly ($P < .05$) reduced performance times in all cases. Highest elevation of pretest variables observed not to affect $\dot{V}O_2max$ were $\dot{V}O_2$ (standing) .5058 L/min; HR 118 bts·min^{-1}; HLa 78 mg% and T_c 37.9° C. It was concluded that, within defined limits, valid and reliable assessment of $\dot{V}O_2max$ is possible even though testing is initiated with subjects in varying stages of exhaustion.

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March 25, 1977
5:30 pm

THE EFFECT OF SUPERVISED AND UNSUPERVISED TRAINING PROGRAMS ON WORK CAPACITY, CARDIORESPIRATORY FUNCTION, AND BODY COMPOSITION OF MIDDLE-AGED MEN. B. A. Ward, L. R. Gettman, and M. L. Pollock, Institute for Aerobics Research, Dallas, Texas 75230.

The purpose of this investigation was to determine the physiological changes elicited by an endurance training program for policemen 36 to 52 years of age and to compare the results of a supervised (S) training program with an unsupervised (U) program. Subjects were randomly assigned to three groups: S (n=11, $\bar{X}$ age = 41.3 yrs); U (n=11, $\bar{X}$ age = 41.3 yrs); and control (n=7, $\bar{X}$ = 39.9 yrs). Training consisted of a standard 15 minute warmup routine of calisthenics and stretching exercises followed by a 23 to 28 minute program of walking and jogging for a period of 20 weeks. The S group exercised under close supervision at a designated location, whereas the U group followed the same training progression but at locations of their choice and with minimal supervision. Covariance and subsequent Newman-Keuls analyses showed that the S and U groups improved significantly in comparison to the control group in the following: treadmill performance time (1:19, 13%; 1:11, 12.5%); maximum oxygen intake (6.6 ml/kg•min, 19.6%; 7.0 ml/kg•min, 21.4%); maximum heart rate (-5 beats/min, 2.7%; -5 beats/min, 2.7%); body fat in percent (-2.5%, 9.9%; -2.4%, 8.9%); total skinfold fat (-18mm, 13.3%; -18 mm, 11%); waist girth (-3.6cm, 3.6%; -3.5cm, 3.4%); resting heart rate (-8 beats/min, 11.3%; -6 beats/min, 9.4%); and step test recovery heart rate (-21 18.3%; -13 beats, 11.4%). The S group decreased significantly in body weight (-3.6kg, 4%) while the U group showed little change (-2.2 kg, 2.3%). No significant changes occurred in strength, muscular endurance, and flexibility measures. In comparing the S group with the U group no significant difference was found in all variables measured, although the S group had a significantly higher attendance record ($\bar{X}$ = 54 workouts/subject in 20 weeks, 2.7 workouts/week) compared to the U group ($\bar{X}$ = 43 workouts/subject in 20 weeks, 2.15 workouts/week). It was concluded that endurance training elicited statistically significant changes in work capacity, cardiorespiratory function, and body composition of middle-aged men regardless of supervision.

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March 25, 1977
5:45 pm

THE EFFECTS OF PRIOR EXERCISE AND VARIED REST INTERVALS UPON CARDIORESPIRATORY ENDURANCE PERFORMANCE. Walter D. Andzel, Kean College of New Jersey.

Female subjects (n=20) aged 18-25 performed PE consisting of a treadmill run designed to raise HR to approximately 140 bpm, which was miantained for two minutes. After the PE, the subjects rested for 30, 60, 90, and 120 seconds before starting an all-out run on a treadmill to exhaustion. They also performed the CT once without any PE. It was found that performance following PE + 30 was significantly better than no PE, PE + 90, and PE + 120. Although PE + 60 just missed being significantly better than no PE, it was significantly better than PE + 90. The improved performance following PE + 30 and PE + 60 was attributed to the mobilization of the O_2 transport system during PE which reduced the O_2 deficit at the beginning of the CT, leaving more of the anaerobic capactiy for use later in the CT.

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March 25, 1977
6:00 pm

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THE DEVELOPMENT OF A MOVEMENT SEQUENCE TEST FOR FIRST GRADE STUDENTS. Jane Benson, Springfield College.

The Movement Sequence Test was developed to be used as a diagnostic tool to help the teacher assess the first grade student's ability to sequence locomotor skills. It was designed in two parts. Part One tested the student's ability to sequence movements by listening to verbal directions and then performing correctly the prescribed sequence of three locomotor skills; Part Two was designed to evaluate the student's ability to sequence three given locomotor movements three different ways and to see if he could correctly relate each sequence to the test administrator. The test was developed for testing small groups of four to six first grade students at one time, to be used in the spring of the year after first grade students should have mastered the ten locomotor skills selected for the test. The procedures used in this study included developing the test, selecting the test items, establishing scoring procedures, evaluating the test, administering the pilot test, revising the test, administering and video-taping the actual test. A pilot study was conducted using 57 first grade students from Beal School, Springfield, Massachusetts. The subjects for the actual testing were 217 first grade students from the Springfield, Massachusetts Public School System. In analyzing the data for the Movement Sequence Test, the statistical procedures included a reliability, objectivity and construct validity check as well as the computation of descriptive statistics and norms. The reliability coefficient for Part One of the Movement Sequence Test was .7118; for Part Two, .6478. The objectivity coefficients for Part One were .7676, .6639, and .6912. The coefficients that were computed for the objectivity check for Part Two of the Movement Sequence Test were .8714, .8520, and .8465. Through subjective rating procedures, the Mann-Whitney U statistic was used to determine the validity estimate of the test. The difference between ranks was significant beyond the .01 level indicating the subjects who were rated high performed significantly better on the Movement Sequence Test. The descriptive norms that were computed for the Movement Sequence Test were the median, quartile deviation, and percentile rank norms. Within the limits of this study the following conclusions were drawn: (1) The Movement Sequence Test appeared to be valid test of movement sequencing ability for first grade students; (2) Part One of the Movement Sequence Test produced more reliable scores for first grade students in movement sequencing ability than Part Two of the Movement Sequence Test.

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March 26, 1977
10:45 am

THE EFFECT OF ENVIRONMENT AND ORDER OF TESTING ON A MEASURE OF MOTOR SKILL. Margaret J. Safrit, University of Wisconsin; Carol L. Stamm, University of Iowa; Kathryn R.E. Russell, University of Arizona; Muriel R. Sloan, University of Wisconsin.

Two potential sources of error in measuring motor skills are environment and order of test administration. The effect of administering a test in different environments may markedly affect test performance, especially when measuring gross motor skills. In addition, when a student is required to take a series of tests, the order in which these tests are administered may affect performance on one or more of the tests. The purpose of this study was to examine the effects of environment and order of administration on performance on an overarm throw test. The subjects were 96 University of Wisconsin freshmen and sophomore women who voluntarily took a series of five proficiency tests in physical education. The overarm throw test was administered in two environments. One was a small laboratory with a relatively low ceiling and the second, a gymnasium with a high ceiling as well as extensive floor space. The order of administering the five tests was varied in five ways, so that some subjects took the overarm throw test in the gymnasium before taking the test in the laboratory and others did the reverse. A three-way analyses of variance for unequal cells was used to analyze the data. If the usual F-test was significant the Geisser-Greenhouse conservative test was applied. The first null hypothesis, that overarm throw test performance would not differ across environment, was rejected in favor of the alternative hypothesis. The average velocity of the throw in the gymnasium was significantly higher than the average velocity in the laboratory. Under hypothesis II, the null hypothesis that order would not affect performance was also rejected. Although the difference between the mean scores for the two environments may seem relatively small from a practical standpoint, these values in fact spanned the score a student needed to achieve for exemption purposes. Thus a girl who received an average score on the test in the gymnasium would be placed in the top category of throwers, while her counterpart in the laboratory would fall into the second category. Thus when this test is used for selection purposes, environment can be an important consideration in obtaining optimal performance. If, however, a teacher is only interested in relative performance, the effect of environment may not be as critical. Since no systematic increases or decreases were observed in the order by environment interaction, it is difficult to draw conclusions regarding the effect of order on testing.

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March 26, 1977
11:00 am

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A COMPARISON OF SERIATION AND MULTIDIMENSIONAL SCALING: TWO TECHNIQUES FOR VALIDATING CONSTRUCTS IN PHYSICAL EDUCATION. Diane M. Korell, College of St. Catherine.

The purpose of this study was to examine solutions obtained by the techniques of seriation, one-dimensional multidimensional scaling and two-dimensional multidimensional scaling as varying degrees of error were introduced into particular data sets. Four different **sized** matrices were selected to represent situations that could be applicable to research problems in physical education such as ordering developmental sequences, course objectives, and levels of behavior in curriculum hierarchies. Kendall's Tau (τ) values were computed between the ordering resulting from the matrix with the error and all other solutions for a particular matrix size in order to compare the solutions utilizing various techniques, matrix sizes, and degrees of error. An analysis of variance of the 4x3x3 design of the study yielded three significant main effects with no significant interactions. These included the effects of matrix size, random error, and scaling technique. Tau values served as the dependent measures with ten replications per cell. The main effect of size indicated that the larger matrix sizes produced the most accurate results indicated by higher tau values when compared to the smaller matrix sizes. The main effect of random error indicated that as error increased, tau values decreased. The main effect of technique indicated that the technique of seriation produced slightly more accurate results than one-and two-dimensional multidimensional scaling. The scientific importance of this study was not only to examine solutions obtained by two scaling techniques, seriation and multidimensional scaling, but also to show how these techniques could be used to validate constructs in physical education when ordering is an important consideration. Both techniques could be utilized to order developmental stages, course objectives, and levels of behavior in curricula.

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March 26, 1977
11:15 am

CHARACTERISTICS AND WILD RIVER MANAGEMENT PREFERENCES OF THE CHATTOOGA RIVER USERS. Gordon E. Howard, John Bethea, Jr., Dee Kiger and Rebecca Richardson: Clemson University.

Recent designation of the Chattooga River of North Carolina, South Carolina, and Georgia as a National Wild and Scenic River has made it necessary for the managing agency, the U.S. Forest Service, to evaluate on-the-water users (boaters), their characteristics and river management preferences. This study was undertaken to develop profiles of users in the following areas: 1. demographic characteristics; 2. recreation expectations, and; 3. opinions of a variety of river management options. The users were stratified into two groups: Commercial users - those persons taking guided tours on the river, and; private users - those persons who organize their own river trips as a recreation. During the summer of 1975, 584 questionnaires were mailed to a random sample of commercial users; 525 were mailed to private users. The commercial users returned 61% (357) of the questionnaires while the private users returned 64% (325). The demographic characteristics indicated that the majority of people in both groups were well educated, above average in income and held jobs in the "professional, technical, and kindred workers" census category. More men (90%) than women (10%) were private users, but there was less difference in sexes among commercial users (males = 57%). The median age of private users (27 years) was 2 years younger than that of the commercial users and the private users tended to be grouped in a narrower age range. The users' recreation expectations included enjoying the scenery, experiencing isolation, meeting the challenge of whitewater and, enjoying the companionship of friends. They did not perceive their activity as a means of meeting new friends or as a family experience. At least 50% of the commercial users favored 5 of the proposed management options. At least 50% private users opposed 15 of the proposed management options. Both groups opposed any regulation that would interfere with a user's option to boat when, where and in the manner that he desired. As a group, the private users did not favor any of the river management options.

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March 26, 1977
11:30 am

LIVING ENVIRONMENT AND AGE AS DETERMINANTS OF THE RECREATION MOTIVATIONS OF ELDERLY PERSONS. Leo H. McAvoy, University of Minnesota.

The purpose of the study was to identify the motivations which prompt elderly persons to participate in recreation activities; and to analyze the motivations according to residential environmental types and age to determine if significant differences could be attributed to these variables. The population under study were the non-institutionalized Minnesota residents 65 and older. The research tool used was a structured interview schedule administered to 540 subjects. The sample design was a stratified, target area, cluster sample. The strata were determined by recreation resource availability and residential area types resulting in nine areas. Target cities and counties within areas were chosen according to median family income. Randomly selected sampling points within the nine target areas resulted in 60 interviews for each target area. The data were analyzed according to the selected variables of age and residence area using the subprograms Crosstabs and Breakdown in the Statistical Package for the Social Sciences (SPSS). A Chi-Square statistic was used to determine the independence of variables. The study yielded the following results: 1.) The most important motivations for recreation participation were socializing, self-fulfillment, physical exercise, and closeness to nature, in that order; 2.) Elderly persons living in outdoor recreation resource rich environments, and the younger elderly, rated the motivations of physical exercise and closeness to nature significantly higher than metropolitan area and older elderly; 3.) Learning as a motivation was rated significantly lower in importance by metropolitan area subjects and older subjects; 4.) The importance of reminiscing increased significantly with age while rest and relaxation declined; 5.) The percentage of respondents choosing solitude as a very important motivation was disproportionately lower for the inner-city subjects. The major conclusion of the study was that the recreation motivations of the elderly vary significantly according to residential environment and age.

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March 26, 1977
11:45 am

FACTORS AFFECTING LIFE SATISFACTION AND ACTIVITY LEVELS OF SENIOR CITIZENS AT SELECTED LOCATIONS IN MARYLAND. Robert O. Ray, University of Wisconsin.

If demographic trends continue, a major change in population age distribution will be observed. In 20-40 years, the presently young majority will become a powerful group of older people who will be able to obtain services currently denied the elderly. As needs and demands increase, a major area of concern will be leisure services. Therefore, the present study gathered and analyzed life quality and activity levels in relation to selected demographic variables. Demographics examined where location of residence (urban, suburban, rural), sex, race, age grouping, length of residence at current address, type of residence, educational level, marital status and income level. Examination of significant variables may permit more effective planning than present fractional approaches. One hundred twenty-four subjects over 65 were stratified by sex, race and location based upon 1971 Maryland census tracts. Subjects were interviewed by researchers using a Life Satisfaction Index, Adult Activities Inventory and Demographic Variable Sheet as guidelines. Satisfaction and Activity scores were divided into "low" or "high" categories based upon median scores. Variable interaction was determined using a cross classification analysis of multi-dimensional contingency tables of log-linear design. Significant interaction existed between sex and activity levels and between satisfaction and activity levels. Further, activity breadth significantly affected satisfaction, but frequency did not. Surprisingly, geographic location of residence did not affect satisfaction or activity. While the supposedly stimulating urban atmosphere did not create satisfaction in old age, neither did rural and suburban areas with their particular lifestyles. Sex classification significantly interacted with activity indicating women were more active than men. Perhaps due in part to role changes of men from a work to leisure orientation where traditional female roles do not change. Variables popularly purported to affect life quality did not. Formal education, marital status, income, residence type, age and length of residence in a community had no significant influence on satisfaction or activity. Contrasting "disengagement theory," a significant relationship existed between satisfaction and activity, indicating active elderly are happier than less active peers. Further, activity breadth significantly affected satisfaction, where frequency did not. Perhaps exposure to a variety of activities is more important than concentration on a few activities.

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March 26, 1977
12:00 pm

THE EFFECT OF BASKET HEIGHT ON REBOUND AREA. P. E. Allsen, Brigham Young University; James Lamph, Ricks College; Gale Bryce, Brigham Young University.

The purpose of this study was to determine the effect of the ten and eleven-foot basket heights upon rebound area. For this study, thirty-six subjects were selected according to body height, player position, and skill level. A total of 14,100 rebounds were collected at each of the basket heights, giving the study 28,200 rebounds for examination. Data were collected and then subjected to either Chi Square analysis or Hypothesis Tests for proportions to determine significant differences between basket height and its effect upon rebound area. Results showed that when all of the rebound arcs are combined, there is a difference between the effect of the ten and eleven-foot basket on rebound area. It was also found that shooting location and player position has some effect upon rebound areas when shooting at the ten and eleven-foot baskets. However, from a practical viewpoint, if a rule change to elevate the basket to eleven feet is being considered, it can be concluded that this would have little effect upon rebound area in game situations.

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March 26, 1977
10:45 am

THE EFFECT OF AIR RESISTANCE ON THE ANGLE OF PROJECTION AND RANGE OF A PLACE KICKED FOOTBALL. George R. Colfer and Linus J. Dowell, Texas A&M University.

Purpose: It was the purpose of this study to determine the effect of air resistance on the angle of projection and range of a football kicked from placement. The formula for determining the distance (range) a projected ball will travel without air resistance is $R=\frac{V^2 \sin 2\theta}{g}$. In order to account for air resistance, this formula must be multiplied by a factor "K" varying with the cross sectional area meeting the air stream and the mass of the ball. It was further the purpose to determine "K" (the effect of air resistance) for a place kicked football and to determine the deviation from 45° of the initial angle of projection.

Procedure: The number one varsity place kicker at Texas A&M was used as a subject. He was selected because (1) He was a soccer style kicker and (2) He could consistently place kick the football beyond 50 yards. A 16 mm Bolex Camera with a Vario-Switar 86 lens was used in filming the subject at 64 frames per second. The camera was placed 60 feet from the subject and perpendicular from the path of the kick. A grid was first filmed in the path that the kick was to take place in order to determine distance on the film. Five place kicks were filmed on a still day off astroturf. The velocity of the ball was determined by the distance traveled from the first frame after clearing the foot to the next frame. Angle of projection was determined by the angle the ball made with the horizontal from the first frame after leaving the foot to the next frame.

Results: The angle of projection with the horizontal varied from 26 to 32°. The mean angle of projection was 29° for the place kick, some 15° below the theoretical 45°. "K" ranged from .24 to .29. The mean K value for the place kick was .26 indicating that a place kick in air travels approximately 1/4 as far as it would in a vacuum. Therefore, it may be concluded that air resistance drastically affects the trajectory of a place kicked football.

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March 26, 1977
11:00 am

GROUND REACTION FORCE DURING THE PULL IN OLYMPIC WEIGHTLIFITING.
Roger M. Enoka, University of Washington.

The purpose of the study was to analyze the ground reaction force during the pull in Olympic weightlifting. Previous researchers have characterized the pull as a movement with two stages of extension between which the lifter repositions himself (the scoop). The realignment during the pull has been a recent innovation and its purpose appears to be twofold; (1) reduction of the moment of the barbell about the hip axis, and (2) the reemployment of the knee extensors over their optimum range of motion. Five weightlifters performed three trials at each of three weights; namely, 70, 85, and 100% of the maximum the subjects estimated they could lift under the experimental regimen. The vertical (R_z) and horizontal (R_x, forward-backward) components of the ground reaction force were measured with a Kistler force platform, Type 9261A. These two signals from the force platform were amplified in a Kristal type 9803 Multi Channel Amplifier Assembly and retained on two Tektronix 5103N storage oscilloscopes. Permanent records were obtained by photographing the scope faces with a 35mm Nikkormat camera and Kodak 2475 Recording Film. Simultaneously the movement was recorded with a LOCAM camera, loaded with 4X Reversal Film and operated at 59.2 frames/s. With respect to the system weight, there occurred two periods of weighting (i.e., R_z greater than system weight indicating acceleration downwards). Such a combination of vertical impulses adhered to the design established by Grieve (1970) in a theoretical analysis of successful lifting techniques. According to Grieve the most efficient method of defeating gravity is to apply a large impulse as early as possible; the data obtained in this study supported that contention.

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March 26, 1977
11:15 am

PREDICTION OF MILE TIMES FROM STRIDE LENGTH AND RATE OF LEG ALTERNATION. Robert M. Johnson, Purdue University.

The purpose of this study was to determine if mile times could be predicted by measuring steady pace stride length and leg alternation rate. Seven male and seven female physical education students walked at a steady pace through a 30 foot distance. The number of steps was recorded to the nearest one-half step. Also recorded was the number of steps taken in 10 seconds. The same procedure was repeated while running. Mile times were obtained while walking and running at a steady pace. Spot checks were made in each case to see if the number of steps taken in 10 seconds remained constant. None of the students were competitive runners. Tables were formulated containing predicted mile times. A comparison between predicted times and actual times revealed a 6.2% average difference (walking) and a 6.8% average difference (running). Standard deviations were 3.8 and 8.3 respectively. From these data it is concluded that pace can be a consistent measure even for the non-competitive runner. Furthermore, counting the number of steps in ten seconds is an accurate check on pace. If pace remains constant, running time can be converted to distance: Distance (miles) = Time spent running (seconds)/paced mile time (seconds). Paced mile times can be obtained by timing an evenly paced mile or by counting the number of steps taken in 30 feet and in 10 seconds and using the formula: Paced mile time (seconds) = 10(176 x number of steps taken in 30 feet/number of steps taken in 10 seconds). This is important because it allows a jogger to run for a specific amount of time instead of being restricted to a measured distance for training runs. It is also helpful when quantifying work.

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March 26, 1977
11:30 am

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THE DIRECT LINEAR TRANSFORMATION METHOD FOR THREE-DIMENSIONAL CINEMATOGRAPHY. Robert Shapiro; Donald Blasius; Peter Milburn; Kevin Campbell; James Leo, Biomechanics Research Laboratory, University of Illinois.

Recent advances in photogrammetry have made possible a new method of three-dimensional cinematography for use in the examination of human motion. The purpose of this study was to adapt the 'Direct Linear Transformation' method developed by Abdel-Aziz and Karara[1] for use with high speed cine techniques and test the accuracy of this method in both static and dynamic situations.

High speed cinematographic techniques utilizing two locam cameras were employed to film a series of points whose spatial coordinates were known. From knowledge of these 'control' points the parameters representing interior and exterior orientations known, the spatial coordinates of unknown fixed points were calculated. As a dynamic test, displacement-time characteristics as well as vertical acceleration were calculated for a ball rolling down an incline and in free flight.

Position data were very accurate. The mean deviations of computed coordinates from the actual coordinates were 4 mm in the Z direction, 4 mm in the X direction and 5 mm in the Y direction. Displacement-time data in the X, Y, and Z directions for the dynamic test were as expected. The calculated vertical accelerations of the ball during free flight were within 1-7% of the expected value of g. (9.8 m/sec^2)

Within the limitations of this study the following conclusions were warranted. The photogrammetric method was applicable and adaptable to cinematographic techniques. The accuracy of this method far exceeded those presently in use and more than adequately meets the needs of human movement research.

The implications of this study were far reaching. The methodology of photogrammetry has been expanded so that it is now applicable to cinematographic systems readily available to physical education researchers.

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[1] Abdel-Aziz, Y.I. and Karara, H.M., "Direct Linear Transformation from Comparator Coordinates Object Space Coordinates in Close-Range Photogrammetry," Proceedings of the ASP/UI Symposium on Close-Range Photogrammetry, Urbana, Illinois, January, 1971.

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March 26, 1977
11:45 am

MECHANICAL GUIDANCE OF THE GOLF SWING: THE GOLFER'S GROOVE AS AN INSTRUCTIONAL ADJUNCT. Gary S. Skrinar, University of Pittsburgh; Shirl J. Hoffman, University of Pittsburgh.

The purpose of this investigation was to study the effectiveness of the Golfer's Groove, a mechanical device which restricts displacement of the golf club through a standard swing plane, as an instructional aid for beginning golf classes. Fourteen beginning golfers, enrolled in a seven and half week instructional series, matched according to pretest scores on a golf skill test were randomly divided into two groups. One group received instruction using the Groove and the other group received a similar amount and type of instruction without the Groove. The Vanderhoof Drive Test was used to assess learning as reflected in changes in outcomes. Form was assessed by having golf teaching professionals rate pre and post films of the students using rating scales designed specifically for the study. A multivariate matched pairs t-test of scores on both the Vanderhoof Drive Test and the film analysis disclosed no significant differences between the groups in post test scores. It was concluded that the use of the Golfer's Groove for the subjects involved in this study was not effective in the attainment of higher skill test scores or higher swing ratings by golf professionals.

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March 26, 1977
12:00 pm

A Data-Based Approach for Student Teacher Supervision

Frank N. Rife, University of Massachusetts
Paul W. Darst, Arizona State University

In most teacher education programs, the student teaching experience is the longest and most important field experience. Many people feel that this experience is the longest and most important step in the sequence of becoming certified to teach, and yet the entire experience is seldom based on any research or realistic assessment procedure. A behavioral data-based approach to developing teaching skills seems to offer a number of advantages. Research efforts in this area are necessary to demonstrate the value of the model, for recognizing and understanding possible limitations and for making necessary changes. Elementary physical education student teachers (N=7) were observed along with one class of pupils from each student teacher's assignment during baseline and intervention conditions. Nine categories of teacher behavior and three categories of pupil behavior were observed with an interobserver reliability of 95%. Behaviors were observed by event, placheck, and duration recording procedures and were converted to rates per minute or percentages. These rates per minute or percentages were analyzed by behavior profiles and a multiple baseline design. Intervention consisted of competency based learning modules, instructions, cuing and reinforcement, graphic feedback and goal setting. The competency-based modules consisted of: a general goal, specific terminal behavioral objectives, definitions, learning methods and materials, assessment procedures and a reading sheet. Modules were focused on: instructional feedback, class management, planning, interpersonal relationships, school policies, and student assessment. Results indicated that this intervention strategy had a large positive effect on the following student teacher behaviors: positive reactions to on-task pupil behavior, instructional feedback, negative reactions to off-task pupil behavior, and the use of pupils' first names. A slight change occurred in the following pupil behaviors: appropriate behavior, active behavior, and management behavior. Based on these results, it appears that the competency based intervention system exerted a measure of accountable control over selected categories of student teacher and pupil behavior.

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March 26, 1977
2:00 pm

A BEHAVIORAL PEER ASSESSMENT MODEL FOR SUPERVISING STUDENT TEACHERS IN ELEMENTARY PHYSICAL EDUCATION. Patt Dodds, University of Texas--Permian Basin.

Two pairs of student teachers worked within a behavior analysis model to acquire, maintain, and delete verbal teaching behaviors designated by the university supervisor. Each pair learned behavioral observation and recording techniques, recorded data on their peer, and provided feedback and reinforcement for changes made by the peer in the four major teaching behavior categories--management, initial instruction, skill feedback, and behavior feedback. The total intervention package included competency-based modules designed by the investigator, goal setting, cueing, graphic and verbal feedback, and reinforcement to change the teaching behaviors. A single subject multiple baseline design was used to analyze data across the four subjects in percentages and rates for each separate teaching behavior which was under intervention (total = 39). Each teaching behavior category was intervened upon only after the goals for the previous categories had been met. Results indicated that reductions could be made in total managerial time and number of managerial episodes per class, and increases could be made in openness of instruction, questions asked, instruction directed to individuals, positive and specific skill feedback, and skill feedback to indivduals. Conclusions were that student teachers can contribute significantly to their own supervision under contingencies of applied behavior analysis, that intensive training is needed for student teachers to achieve acceptable coding reliability, and that a systematic behavioral approach is a viable means of helping student teachers to change each other's teaching behaviors in elementary physical education environments.

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March 26, 1977
2:15 pm

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THE CONCEPTS APPROACH TO COLLEGE PHYSICAL EDUCATION: A FIVE YEAR STUDY. W. Leroy Fanning, University of Tennessee at Chattanooga

It was the purpose of this study to present a conceptualized approach to physical education as an alternative to the development of sports skills. Sports skill development was replaced by a conscious systematic development of specific concepts and applications of the process of becoming physically educated. Measurements and evaluations were taken in the following categories: (A) Coopers 12 Minute Run Pre and Post; (B) Kenyon Attitude Scale and Wear Inventory of Values of Physical Education; (C) Heart Rate: Resting, Maintenance, Exercise - Beginning and Ending and Follow-Up One, Two, and Three Years After the Course; (D) Sports Skills Participation as Surveyed by Questionnaire - Pre and After One, Two, and Three Years After the Course. Physical Education classes were conducted for a period of 18 weeks using instruction in a conceptualized mode. Students received information about the process of physically educating themselves through the media of laboratory experiments. Each student conducted investigation in the following categories: Value of Physical Education, Physical Fitness and How Measured, Cardiovascular Threshold of Training, Isometric and Isotonic Strength Testing, Evaluating Muscular Endurance, Flexibility, and Body Fatness; Selecting Sports Skills for Leisure Time Recreation. Conclusions reached included: (1) Cardio-respiratory function as measured by the 12 Minute Run was significantly improved; (2) The value of Physical Education as Measured by Kenyon Attitude Scale was significantly improved; (3) Follow-Up Questionnaire showed greater stated participation in recreative sports. (4) Follow-Up Measurement of Cardio-respiratory gains showed a decrease of previous cardio-respiratory gains.

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March 26, 1977
2:30 pm

APPLICATIONS OF CONSTRUCT VALIDITY AND FACTOR ANALYSIS TECHNIQUES IN AN ASSESSMENT OF NEEDS IN PHYSICAL EDUCATION. Mel E. Finkenberg, California State University, Los Angeles.

The purpose of this study was to develop a valid and reliable instrument to assess psychomotor, cognitive and affective physical education needs of secondary school students. The format of the instrument was determined after a careful analysis of the survey theory and literature pertaining to needs in physical education. Forty-seven survey items were generated by a matrix which had 3 dimensions: Program Categories, Behavior Dimensions and Sample Population. Of the 47 items, 5 were either repeated or re-phrased to assess reliablility of responses and were not included in the statistical portion of the analysis. Responses were indicated by a scale ranging from 7 (very important) thru 1 (not at all important). Students, parents, physical education teachers, athletic coaches and nationally acknowledged curriculum specialists in physical education were administered the instrument. The students were subdivided into groups of males-females; high level performers-non-athletes; and, students from high SES schools -students from low SES schools. The responses were subjected to a principal components factor analysis with varimax rotation. As a result, 6 factors representing 2 psychomotor categories and 4 combined affective/cognitive categories were derived. Reliability coefficients for each factor were obtained using an alpha solution, resulting in coefficients of generalizability ranging from .96 to .73. As a result of factor analysis techniques, a valid and reliable instrument was developed to effectively elicit perceptions of a variety of groups toward physical education needs of secondary school students. The inclusion of 5 repeated or re-phrased items was effective to determine repeatability of responses. The instrument developed in this study is a valid tool for assessing needs in physical education. Construct validity techniques support the acceptance of 4 identified developmental categories as the basic purposes of the physical education programs.

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March 26, 1977
2:45 pm

A COMPARATIVE ANALYSIS OF BRITISH PHYSICAL EDUCATION

George J. Holland, California State University, Northridge.

This study was undertaken for the purpose of comparing the present system of preparing Physical Education personnel in Britain with American programs. The study was accomplished over a period of six months travel to many of the major training institutions, during which time dialogue was established with program directors, faculty and students. It was concluded that American and British Physical Education share more commonalities than differences. The quality of academic standards in British professional Physical Education schools is higher than the counterpart in America, although faculty do not enjoy as high an academic stature. Much of the academic requirements are externally imposed by the British Institute of Education which acts as the accrediting body. Strong professional associations provide national leadership through the Physical Education Association of Great Britain and Northern Ireland, as well as the British Association of Advisors and Lecturers in Physical Education. Both organizations publish quality educational journals and the British Association of Sport and Medicine publishes a well documented clinical and research oriented journal. Unlike the U.S. the Recreation and Health Education curricula are still encompassed by Physical Education and will probably remain there for many years. There is in British Physical Education a rapid expansion of the disciplinary knowledge in such areas as Sport psychology, Physiology of Exercise, and Kinesiology. The British Institutions of Higher Education have suffered budgetary cutbacks equal to or greater than U.S. institutions during the last several years. This is resulting in student cutbacks which appear warranted due to the poor placement of certified Physical Education graduates. There is great interest among British Physical Educators regarding the changing American Physical Education discipline and profession. It would appear that both countries and all of education would benefit significantly from the development of formal dialogue between national professional associations as well as student and faculty exchange programs.

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March 26, 1977
3:00 pm

THE EFFECTS OF SUPERVISION AND INSTRUCTION IN USE OF INTERACTION ANALYSIS ON TEACHING BEHAVIOR AND EFFECTIVENESS OF PRE-SERVICE TEACHERS. Diane A. Rochester, Ithaca College; Victor H. Mancini, Ithaca College, Harold H. Morris, Ithaca College.

The purpose of this investigation was to determine the effects of instruction and supervision in the practical application of coding interaction analysis on the teaching behavior of secondary methods physical education majors and to determine the relationship between teacher-effectiveness and teacher-behavior variables. Teacher behavior was identified through use of Cheffers Adaptation of Flanders Interaction Analysis System (CAFIAS). Teacher effectiveness was assessed through use of the Teacher Performance Criteria Questionnaire (TPCQ). Subjects were 36 undergraduate physical education methods students who were randomly selected and assigned to treatment or control groups. Each subject taught micro-peer lessons that were videotaped for feedback and evaluation of teacher effectiveness. All subjects received instruction and supervision in secondary methods and knowledge of CAFIAS. Prior to the final teaching assignment, treatment subjects were also instructed in the coding process and under supervision used Cheffers' system to code videotaped lessons. Data for final analysis of teacher behavior and teacher effectiveness were collected from the last lesson taught by each subject. A significant difference in teacher behaviors between groups was determined through multivariate analysis of variance. Stepwise discriminant function analysis indicated that, in sequence, nonverbal pupil initiation--teacher suggested; verbal pupil initiation--student suggested; verbal teacher questioning; and teacher talk contributed to a significant discriminant function. Further, canonical analysis determined two significant correlations between teacher-effectiveness and teacher-behavior variables. The following conclusions were drawn: 1. Less teacher talk, more teacher questioning, and increased pupil initiative behavior occurred in classes taught by pre-service teachers trained in the coding of interaction analysis; 2. The combined use of instruction in the knowledge and practical application of coding interaction analysis and reviewing videotapes was found to be beneficial to the supervision and teacher preparation of pre-service teachers; and 3. Teaching behaviors of pre-service teachers, as identified through use of interaction analysis, are related to performance on teacher-effectiveness variables identified through a review of process-product studies.

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March 26, 1977
3:15 pm

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DEVELOPMENT AND USE OF THE PHYSICAL EDUCATION OBSERVATION INSTRUMENT FOR RATING PATTERNS OF TEACHER BEHAVIORS IN RELATIONSHIP TO STUDENT ACHIEVEMENT

John Lawrence Taylor, Ed.D. University of Illinois, Urbana Doctoral Dissertation Stanford University 1976 Advisor John E. Nixon

The investigator conducted an exploratory process-product study within the parameters of high school physical education,(P.E.), settings and curriculum with the following objectives in mind: 1)The development of an observation instrument which will reliably measure P.E. teacher and student behaviors when a motor skill is the subject.2)The measurement of teacher behaviors on the Physical Education Observation Instrument(PEOI),in order to identify behaviors which contribute to student learning of motor skills.3)The identification of patterns of effective teacher behaviors that build a foundation for future research in P.E.PEOI, which includes 14 teacher/student behavior variables was developed by the investigator to record the type and frequency of teacher and student interactions during the teaching of a motor activity.Rater stability using the PEOI was established via Generalizability-Study procedures,and raters were found to be highly consistant on 13 of the 14 behavior variables.Volleyball skills were selected as the P.E. activity to be taught in the observational state of the study.Twenty-one male P.E. teachers and their 9th-12th grade students were selected for study from 11 h.s. in the San Francisco Bay Area.Pretest/Posttest measures were administered and included teacher and student preactivity questionnaires and the Russell and Lange Achievement Test in volleyball.Each teacher emphasized the volleyball skills of volleying and serving in five separate half-hour instructional occasions while being observed by a rater using the PEOI.Posttesting was conducted after 2 1/2 hours of observation.A multiple regression analysis indicated that the teacher behaviors of individualization and explanation formed a linear model to predict student achievement in repeated volleys,and teacher demonstration and reinforcement formed a linear model to predict student achievement in volleyball serving.The PEOI was thus found to be an appropriate tool for rating the frequency of teacher and student behaviors in P.E.The interactions between teachers and students were accurately recorded and patterns of teacher behaviors appeared as stable contributors to the instructional process.The student outcome provided strong support for the notion that certain teacher behaviors are more effective than others in the instructional process.

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March 26, 1977
3:30 pm

INVOLVEMENT OF SELECTED QUADRICEP MUSCLES DURING A KNEE EXTENSION EXERCISE. Terence L. Andres, University of Illinois.

The effects of weighted treatments on the electrical activity of quadricep muscles was investigated. Integrated surface EMG's were obtained from the vastus medialis, vastus lateralis, and rectus femoris muscles during a knee extension exercise. Each of the fourteen male subjects performed the exercise under two resisted conditions. A two-factor ANOVA and Tukey Multiple Comparison procedures were used in the analysis. At the .05 level, treatment main effects were significant. No statistically significant differences were found in the muscle main effects, or in the treatment on muscle interaction effects. The results reflect an apparent difference between statistically significant and clinically significant increases in EMG activity.

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March 27, 1977
9:00 am

THE ROLE OF CONTRACTION-DURATION IN MUSCULAR FATIGUE. David H. Clarke, University of Maryland.

Subjects (N = 19) were college aged males who volunteered to engage in fatiguing hand-grip exercise, to evaluate the role played by the duration of contraction in controlling the progress of muscular fatigue. The task consisted of alternately contracting and relaxing the forearm flexor muscles, each contraction being a maximum effort. The hand-grip device was connected to a load cell, which in turn was coupled to a dynograph recorder. The cadence was established by metronome in such a manner that the intercontraction rest interval was constant at one second and the contraction duration varied between 1, 2, 3 and 4 seconds. The length of each of the four exercise sessions was five minutes and all subjects engaged in all treatments in randomized order. Each exercise condition resulted in a curvilinear fatigue pattern of an exponential nature, having an equation of the form $y_t = a_1 e^{-k_1 t} + a_2 e^{-k_2 t} + c$, in which the strength y approaches the asymptote c at any time t under control of the rate constant k. The value a is the amount of fatigable strength, and e is the Naperian log base. The main rate constant varied between k = .010 and .013 sec^{-1}, a difference of approximately 22 per cent, the slowest fatigue occurring when the contraction duration was one second in length, and most rapid when it was four seconds. The attainment of a steady state (c) at the end of exercise reflected the effect of the change in contraction duration, the values decreasing as an inverse function of time of contraction, being significantly different (F = 17.4) by the end of five minutes. The relative decrement (a) was also significantly different for conditions (F = 5.5), and since initial strength was not different, it followed that the total work done would vary significantly among conditions (F = 36.1). While past research has suggested that the effect on strength decrement is a curvilinear function of intercontraction rest interval when contraction-duration is held constant, the present data indicate that when the contraction-duration is varied, with the rest interval being constant, the effect on lowering the level of strength at the end of exercise is linear. The same occurs with the rate of fatigue as well, although in both cases the rate and amount of absolute decrement are not as great as when the rate of muscle contraction is increased.

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March 27, 1977
9:15 am

ISOKINETIC MEASUREMENT OF STRENGTH IN BLACK AND IN WHITE UNIVERSITY WOMEN. Elizabeth Lee Closs, Texas Woman's University.

The specific problems of the study were to determine if there were (1) significant relationships among peak torque values of isokinetic contractions, (2) significant differences between ethnic groups in peak torque relationships, (3) significant differences between slow (10-RPM) and fast (30-RPM) velocities in peak torque relationships, and if (4) general criterion strength values could be predicted from test batteries of selected isokinetic contractions. Subjects, 60 black and 60 white women, were randomly selected from university physical education activity classes. Maximal isokinetic contraction data were collected with a Cybex II Isokinetic System manufactured by Lumex, Incorporated. Peak torque on three test trials was recorded for both extension and flexion of the wrist, elbow, shoulder, hip, knee, and ankle joints on the preferred side of the body at 10- and 30-RPM. Full range of motion was recorded and the trial with the highest peak torque was used in data analyses. The sum of all peak torque values analyzed was used as the general strength criterion score. Simple correlation, a t statistic, Fisher's transformation to z, and stepwise multiple linear regression were used to analyze the data. Findings of the study were: (1) antagonist muscle relationships had the highest coefficients with the elbow ranking first in all groups except that of black women at 30-RPM; (2) all variables were significantly related to the strength criterion score except elbow extension and flexion at 10-RPM and elbow flexion at 30-RPM for black women, and ankle extension at 10-RPM, and wrist and ankle extension and flexion at 30-RPM for white women; (3) significant differences were found between ethnic groups in hip and knee extension relationships with the criterion strength value at 10-RPM; (4) no significant differences were found at 30-RPM; (5) significant differences were found between 10- and 30-RPM velocities in hip and elbow extension and flexion, and knee extension; (6) criterion strength prediction equations for black women at 10-RPM and combined ethnic groups at 30-RPM included hip, knee, and shoulder extension and flexion; and (7) the same variables, except shoulder flexion, were used in the equation for white women at 10-RPM. The following conclusions were drawn: (1) a wide range of relationships exists among maximal isokinetic contractions with some ethnic and velocity differences being evident for university women, and (2) strength criterion values for isokinetic contractions can be predicted from test batteries of selected isokinetic contractions.

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March 27, 1971
9:30 am

A COMPARISON OF SUCCESSFUL AND UNSUCCESSFUL BLACK AND CAUCASIAN INTERSCHOLASTIC FOOTBALL PLAYERS ON SELECTED STRENGTH, MUSCULAR ENDURANCE, MUSCULAR POWER, AND ANTHROPOMETRIC MEASURES. James M. DiNucci, Stephen F. Austin State University.

The investigation was undertaken to assess possible physical differences between Black and Caucasian interscholastic football players rated as either successful or unsuccessful by their respective coaches on a predetermined objective criteria of success. The subjects were 104 Caucasian and 206 Black football athletes enrolled in the class 4-A schools of Shreveport, Louisiana. Each subject was administered the following test items: standing height, body weight, arm girth, calf girth, right grip strength, left grip strength, back lift, leg lift, Roger's Strength Index, Roger's Arm Strength Score, bar dips, pull-ups, Roger's Physical Fitness Index, and the standing broad jump. The data were analyzed by application of a double classification analysis of variance to the 2x2 factorial design utilizing race as the columns and success as the rows. For F-ratios found significant at the .05 level, the Scheffe method of multiple comparisons was employed to test mean differences. Significant race differences in favor of the Caucasian athletes were observed for body weight, arm girth, calf girth, back lift, leg lift, Roger's Strength Index, Roger's Physical Fitness Index, and the standing broad jump. The Black athletes were not significantly superior to the Caucasian athletes on any of the variables under investigation. Mean comparisons between the athletes rated as successful and unsuccessful found the successful athletes scoring significantly higher in standing height, body weight, arm girth, calf girth, back lift, pull-ups, and Roger's Physical Fitness Index. The interaction comparisons were not significant.

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March 27, 1977
9:45 am

THE EFFECT OF EXTERNAL CUE MANIPULATION UPON MAXIMUM WEIGHT LIFTING PERFORMANCE. R. Gary Ness and Robert W. Patton, North Texas State University.

This study examined the role of external cues in maximum strength lifting performances on a resistance exercise machine. Forty-eight college male volunteers engaged in physical education activities unrelated to strength development were randomly assigned to three groups. All subjects performed a maximum incline press on a resistance exercise machine one day per week for three weeks to establish a stable one repetition maximum. Subjects were instructed to set the resistance and record their own maximums. For subsequent lifts during weeks four and five the machine was altered to misrepresent plus or minus 20 lbs. the actual weight being lifted. The heavier and lighter treatments were rotated in the first two groups, while the machine was unaltered for the control group. During the sixth week all subjects were tested without the benefit of knowing exactly how much weight they were lifting. The experimenters set the resistance. All subjects were tested individually throughout the experiment. The 3 x 3 factorial design with repeated measures provided for two main effects. One main effect was to determine the possible influences of group assignment. This was found to be statistically insignificant and suggested that no sequence effects in the treatments were realized. However, the main effect for the repeated measures was found to be significant ($p < .05$). Multiple comparisons of the treatments revealed that subjects exceeded previous maximums when the resistances were misrepresented below the actual weights. This would suggest that subjects' self-expectations based upon false environmental cues affected their eventual performances.

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March 27, 1977
10:00 am

RECOVERY OF MUSCULAR ENDURANCE FOLLOWING SUBMAXIMAL, ISOMETRIC EXERCISE. G. Alan Stull and Jay T. Kearney, University of Kentucky.

The ability of the hand-gripping muscles to recover from fatigue elicited during a previous bout of submaximal, isometric exercise was investigated. Upon reporting to the laboratory for testing, each of the 22 male subjects was tested for grip flexion strength on a hand dynamometer in series with a load cell and recorder. Three strength trials were given with a rest interval of 30 sec. interspersed between successive trials. The mean of the three trials was taken as the subject's maximum voluntary strength (MVS). Following a rest period of approximately 2 min, the subject attempted to maintain for as long as possible a contraction at a tension equal to 50 percent of his MVS. When the prescribed tension could no longer be maintained, he was given a rest period and at the conclusion of the rest period again squeezed the hand dynamometer as long as possible at a tension equal to 50 percent of his initial MVS. The length of the rest period between the two exercise bouts was either 5, 10, 20, 40, 80, 160, 320, 640, 1280, or 2560 sec. Each subject experienced every rest period with the order of administration being assigned at random. A minimum of one week intervened between successive testing sessions. The mean time the subjects persisted during the first bout was 122.95 sec. Percentage of recovery, calculated by dividing the holding time of the first bout into the time of the second, ranged from 20.3 percent after 5 sec of rest to 86.8 percent following the 2,560-sec rest interval. An exponential analysis of the percentages of recovery at the various time intervals revealed that a three-component curve of the form

$$Y_t = 1.000 - (a_1e^{-k_1t} + a_2e^{-k_2t} + a_3e^{-k_3t})$$

was necessary to describe the recovery pattern. The values for k_1, k_2, and k_3 were .02710, .00635, and .00027 and for a_1, a_2, and a_3, .162, .387, and .247, respectively. The correlation coefficient between the observed and plotted values was .997.

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March 27, 1977
10:15 am

BIRTH ORDER, MOTOR PERFORMANCE, AND MATERNAL INFLUENCE. Carol L. Alberts, Smith College; Daniel M. Landers, The Pennsylvania State University.

This investigation examined birth-order effects on children's actual motor performance as well as mothers' and children's aspirations for future performance. The subjects were 12 first- and 12 second-born boys and girls and their mothers. These children were enrolled in first and second grade. The subjects were tested in two conditions, varying in degree of physical harm, to examine the hypothesis that first-borns are more achievement oriented and perform better than second-borns, except in situations where the potential for physical harm is high. For the low-harm-anxiety condition (LHA) a ball rolling for accuracy task was used. In the high-harm-anxiety condition, (HHA), the child was asked to jump from heights up to six feet. As predicted, first-borns were significantly more accurate ($p < .05$) in actual performance of the LHA task. Furthermore, mothers level of aspiration for her first-born child and that child's aspirations for himself were significantly higher than those given by their second-born counterparts. By contrast, significantly greater physical risk was taken by second-borns in the HHA situation. Mothers of second-borns expressed significantly higher risk-performance aspirations than mothers of first-borns. No aspiration differences were found between first- and second-born children in the HHA situation, nor were any of the LHA and HHA aspiration and performance differences effected by the sex of the subject. The results indicate that children's performance on these tasks varies directly as a function of birth-order, and that these performance differences coincide with mothers' perception of the child. These findings support previous research which suggest that different maternal expectations for their first- and second-born children may affect the child's expectations and performances, the direction of influence being dependent on the nature of the task.

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March 27, 1977
9:00 am

COHESION: CAUSE VERSUS EFFECT. Albert V. Carron and James R. Ball, University of Western Ontario.

The purpose of the study was to examine the direction of causality for both cohesion and participation motivation with performance in intercollegiate ice hockey. Twelve teams (total = 183) were tested for cohesion (ie. interpersonal attraction, personal power or influence, value of membership, sense of belonging, enjoyment, teamwork, closeness and total) and participation motivation (ie. self, task and affiliation orientation) in early, mid and post season. The data were analyzed using a cross-lagged panel correlation technique. The results supported a conclusion that successful performance results in increased team cohesiveness; team cohesiveness does not produce more successful performance. There was no indication that high self, task and/or affiliation motivation either led to more successful performance or that successful performance increased the level of self, task and/or affiliation motivation.

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March 27, 1977
9:15 am

"POWER ELITES" AND AMERICAN SPORT. Mark Clark, Stanford University

This study represents a heuristic exploration into the world of "power elites" in American society. Hoch (Rip Off The Big Game) speculates about the role of professional sport team management within the concept of American power elites. The purpose here is to add validity to Hoch's speculations. Inter-institutional links of team presidents in three professional sports (basketball, baseball, football) were investigated. Mills' (The Power Elite) idea of inter-locking elite positions of decision making was used as the conceptual basis for data gathering. Volumes of Who's Who were reviewed for data pertaining to the respective presidents' sport and non-sport business links. Government, education, media, and community "citizenship" links were also investigated. Data was found for 53 of the 67 (79%) listed presidents. Data shows that there were 206 business links, 32 governmental links, 29 educational links, and 31 media links. Categories are mutually exclusive. Trends, by sport, indicate that football presidents lean toward business links in transportation, oil and finance. Basketball presidents are heavily involved in real estate and transportation. Baseball presidents are widespread in their business links. Other categories of links were fairly evenly distributed throughout the three sports, except that more basketball presidents (proportionally) were involved in other sport management. Ideology largely determines data interpretation, but trends seem to indicate that there are direct connections/relationships between sport ownership and:

1) corporate/financial decision making
2) political decision making
3) media/educational decision making

These conclusions were then used to infer that sport ownership connects with the American ruling class/power elite at a peripheral level, and that sport could be used as a means of mass society control. Further study should be undertaken to more firmly establish the relationship of sport/power elite decision making and substantiate sports possible usage as a means of social control.

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March 27, 1977
9:30 am

THE ATTITUDES OF FOUR-YEAR COLLEGE FACULTY WOMEN TOWARD CERTAIN QUESTIONABLE PRACTICES IN WOMEN'S ATHLETICS. Sally Hattig, Bowling Green State University; This research was a part of a Master's Thesis submitted in partial fulfillment of requirements for Masters' Thesis under the direction of Dr. Kathleen M. Pearson, Western Illinois University.

The purpose of this study was to determine the attitudes of four-year college faculty women toward certain questionable practices in women's athletics. Attitudes were surveyed concerning questionable practices in three categories: team sports situations; individual sports situations; and general sports situations. The survey instrument was constructed and used to obtain the data. The instrument consisted of forty-seven situation-response statements to which the subjects were asked to respond by checking: "Strongly Approve"; "Approve"; "Neutral"; "Disapprove"; or "Strongly Disapprove." Each response was weighted as follows: "Strongly Approve", 1; "Approve", 2; "Neutral", 3; "Disapprove", 4; and "Strongly Disapprove", 5. The subjects were full-time female physical educators and coaches from eleven four-year public colleges and universities in Illinois during the 1974-75 academic year. One hundred sixty-nine possible respondents were sent a survey instrument. One hundred thirty-two instruments were received thus representing a 78 per cent return based on the initial population. Of these 132, fifteen were incorrectly completed leaving a total population of 117 or 69 per cent usable return. Five comparisons were made using the mean response for each group. The researcher found the greatest reaction of disapproval among current coaches concerning questionable practices which occur in individual sports situations. Although the subjects reacted to questionable practices in athletics by showing disapproval in all three categories, the strongest disapproval was recorded in relation to questionable practices in individual sports. Team sports situations followed with the general sports situations receiving the least strong reaction of disapproval. As the comparisons indicate, physical educators and coaches have a definite concern regarding questionable practices in athletics and have reported their disapproval of such practices. The mean responses of all eleven groups of physical educators leaned more heavily toward disapproval than toward approval concerning questionable practices in individual sports, team sports, and general sports situations.

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March 27, 1977
9:45 am

RELATIONSHIPS BETWEEN SELECTED CHILD-REARING ATTITUDES OF PARENTS AND THE JUMPING AND THROWING PERFORMANCE OF THEIR PRE-SCHOOL CHILDREN. Elizabeth Schnabl-Dickey, Purdue University.

In an investigation of parental child-rearing influences on the motor development of preschool children, relationships between children's jumping and throwing performance and parents' child-rearing attitudes were assessed. Parents were administered the Maryland Parent Attitude Survey, a forced choice instrument, to assess disciplinarian, indulgent, protective, and rejecting child-rearing attitudes. Fifty-eight 3, 4, and 5-year-old children and their parents participated in the study. In general, permissive, indulgent home environments characterized by low disciplinarian, high indulgent, and high protective child-rearing attitudes were positively associated with higher maternal discipline.

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March 27, 1977
10:00 am

CHILDHOOD GAMES PLAYED BY SUCCESSFUL WOMEN: A PILOT STUDY.
J.S. Toyama, University of Massachusetts; V.M. Barfield, University of Minnesota.

The purpose of the study was to investigate the types of games (chance, physical skill, strategy) played by successful women during the ages 6-12 years. Previous research has shown sex differences in game preferences. Specifically, females tend to play games of chance; males prefer games of physical skill and of physical skill and strategy. According to the conflict-enculturation hypothesis (Roberts & Sutton-Smith, 1963), games are related to childhood training practices. Games of chance are associated with obedience training; games of physical skill to achievement; games of strategy to responsibility. It was hypothesized that successful women might not necessarily conform to the findings of women, in general. The research reported here specifically deals with sex of playmates and extent to which respondents perceived self as tomboys. A pilot study was conducted during Spring, 1976, at the University of Massachusetts. A mail questionnaire was sent to 408 full-time professional academic and non-academic women with a return rate of 50%. The questionnaire included demographic information as well as background questions and a list of games used by Sutton-Smith and Rosenberg (1961). The data was submitted to ANOVA in terms of types of games played as well as reported preferences for individual games by sex. Sex of playmates was significant for the number of male games and games of physical skill. That is, those playing mostly with males participated in these types of games. The extent of "perceived tomboyishness" was linearly related to the total number of games, the number of male games, the number of games played by both males and females, the number of games of physical skill and the number of games of physical skill and strategy. These findings suggest that successful women may conform to both male and female patterns of game preference.

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March 27, 1977
10:15 am

SPORT: THE METER STICK OF THE CIVIL WAR SOLDIER

The Civil War soldier was the youth of America trying desperately to prove his manhood. Civil War diaries are replete with expressions of veneration for friends, comrades, and even distant acquaintances who died with their face to the enemy or who displayed heroic valor on the battlefied. Yet, there were other less perilous methods of proving one's worth or of courting the esteem of one's fellows.

Sport was the measuring ground for assessing specific competencies thought to be related to manhood. The Civil War mind was saturated by the notion that men and heroes possessed physical skill and physical courage. During the Antebellum period heroic types such as Andrew Jackson and Daniel Boone had been dressed with Athletic metaphors depicting them as chivalric sportsmen possessing great quantities of physical skill and physical courage. Antebellum social critics such as Thomas Wentworth Higgenson and Oliver Wendall Holmes had implied that the declensions of American society were somehow related to the apparent lack of athletic skill and courage. The soldier society esteemed physical skill and physical courage because they had been nutured in a society that valued these attributes. These were the competencies which were required for manhood.

In the soldier fraternity social acceptance was related to displayed bravery and displayed athletic skill. The individual was judged, and indeed judged himself, on the basis of how well he could ride a horse, box, hit a baseball, pitch a quoit, or excell in a variety of other sport activities. A large number of Civil War soldiers were famous within their own units because of their physical prowess. They hold the esteem and awe of their comrades and were it not for this, their names and exploits would remain with the historically voiceless. For many Civil War soldiers athletic prowess was an organic part of self concept. Much like present day Saturday night athletes, exploits on the sport field became expanded in the telling.

Sport, then, was a measuring ground, a meter stick used to assess competencies such as physical skill and physical courage. These were the Civil War soldiers' prerequisites for manhood and social acceptance. Courage and physical prowess had to be displayed. Snowball shirkers and baseball flops need not apply.

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March 27, 1977
2:00 pm

THE DECLINE OF ATHLETICS AT THE CARLISLE INDIAN SCHOOLS.

Maxwell L. Howell and Reet A. Howell, San Diego State University.

The Carlisle Indian School was an educational institution for Indians, the first school to be opened by the government (1879) for that purpose. It was the first such school to receive congressional recognition and appropriation. The purpose of this study was to analyze the demise of athletics at the Carlisle Indian School. The beginning of the school's sport participation was in 1893, with only two football games being played. The football team was disbanded in 1918, but in its short history the feats of its athletes became legendary, particularly in lacrosse, football and track and field.

The historical method of research was utilized, primary and secondary sources being consulted. The most important primary documents were the Hearings before the Joint Commission of the Congress of the United States, held in February 6,7, and 8 and March 25, 1914, under the chairmanship of Senator Joe T. Robinson. At these hearings, at which 61 witnesses appeared (staff members, students, individuals from the community), it became evident that there were serious morale problems at the institution, which led to it eventually being closed by Congress in 1918. The history of the Carlisle Indian School, then, was a mere 39 years.

It was concluded that there were a number of reasons for the demise of the institution. Among these were societal changes themselves, which affected the type of student coming to Carlisle, and his and her attitudes. The non-English speaking Indian of 1879 differed markedly from the Anglicised Indian of 1918. The outing program, where students were sent to learn "white ways," had lost much of its meaning and effectiveness. There was evidence of graft and corruption by the superintendent, and he was hated by the student body. There was evidence of brutalization of students. But among the most damning of the evidence was directed at the corruption in athletics, the proselytization of athletes, under-the-table payments, special privileges for athletes, the misuse of athletic funds, and the general dislike of the attitude and approach of "Pop" Warner. The elite athlete developed by Warner at the school, with the special privileges that resulted, was a definite factor in the low morale of the school, and its demise. The Carlisle Indian School's story of glory became a story of shame, with athletics a key cause in the decline. This study is the first to make use of these primary documents.

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March 27, 1977
2:15 pm

A BALL GAME PLAYED BY THE FLORIDA SEMINOLES DURING THE GREEN CORN FESTIVAL. Harold A. Lerch and Paula D. Welch, University of Florida.

The purpose of this investigation was to describe the type of ball game played by the Florida Seminole Indians during their observance of the Green Corn Festival. A descriptive as well as interpretive research design was used. Techniques utilized were content analysis of pertinent literature and personal interview. Very little if any attention has been given to the study of games of the Florida Seminole Indian. Because their culture has been passed from generation to generation by word of mouth, no written records of the Seminole people exist. Aftifacts such as pottery and coins were not used to depict their activities. Even their origins are uncertain, however, there is evidence to suggest that by 1715 a group of Indians settled in Florida who came to be known as the Seminoles. The Green Corn Festival, an important religious observance, was celebrated yearly in late June or early July. Included in the festival was a ball game. A circle, approximately thirty feet in circumference, was drawn on the ground and a pole was errected in the center of the circle. A player on the offensive team, composed of any number of persons, caught the ball with a long handled racquet and threw it at the pole in an attempt to hit it for a score. The defensive team, of equal number, tried to prevent the ball from hitting the pole. It may be concluded that a variety of games did not play a major role in the Green Corn Festival. Four factors can be attributed to this: 1) three Seminole wars with the United States between 1817 and 1858, 2) removal of over four thousand Seminoles by the United States to Oklahoma after the second Seminole war, 3) retreat by the Seminoles to the hostile environment of the Everglades, and 4) the collective nature of the Seminoles in noncompetive and organized competition is not a major factor in their culture.

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March 27, 1977
2:30 pm

STRONG BODIES, HEALTHFUL REGIMENS AND PLAYFUL RECREATIONS AS VIEWED BY UTOPIAN AUTHORS OF THE RENAISSANCE. Roberta J. Park, University of California, Berkeley.

Although "Utopias" have often been viewed as nothing more than impractical schemes, there are many students of social history who would agree with Cassirer that utopian literature has traditionally provided for mankind a much-needed vision of a more ethical and humane future. (The influence of utopian thought is never far removed. For example, the utopian theme has been a topic at recent American Historical Association and Pacific Coast Branch AHA annual meetings). All utopias certainly have not advocated the same means for attaining their goals, but most do share in common the fundamental objective of seeking to establish a better society. Consequently, education (the chief instrument of both individual and social perfection) and hygiene and bodily fitness (which increase the likelihood that such perfection may be attained, and then enjoyed) have often received considerable attention in literature classified as "utopian." Utopian authors have also often sought to achieve a balance between work and leisure, and a generous amount of time is frequently recommended for recreational pursuits. In such instances the author is confronted with the task of ensuring that this leisure will be filled with pleasurable and constructive endeavors, and participation in active physical pursuits is often advocated. The emphasis, it may be worth noting, is consistently placed upon active participation, not spectating. A considerable number of the "utopias" which have come to be regarded as historically important appeared during the Renaissance as men came increasingly to believe in the possibilities of a future which allowed room for the efforts of individual human beings. More's Utopia, Campanella's City of the Sun and Andrae's Christianopolis are generally held to be the major utopian works of the 16th and 17th centuries (and prototypes of many later schemes). Each gave a prominent place to hygiene, physical activities and bodily recreations. So did works like Bacon's New Atlantis and Rabelais' The Abbey of Theleme, often included among the more important commentaries of the period in the utopian genre, as well as did such lesser-known treatises as Nova Solyma. This paper investigates the interest in hygiene, physical activities and recreation demonstrated by the authors of these and other 16th and 17th century utopian works, and suggests their importance to the attitude which holds that regular physical education and active recreations must be provided in any well-ordered society.

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March 27, 1977
2:45 pm

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EARLY TWENTIETH CENTURY ARROW, JAVELIN, AND DART GAMES OF THE WESTERN NATIVE AMERICAN. Wilma J. Pesavento, University of Illinois at Chicago; Lisa C. Pesavento, Crete Monee High School, 201 U.

The general purpose of this study was to determine whether the traditional native American ball games continued to be positive culture traits of the American Indian in the early twentieth century. Specifically the investigation was centered about (1) determining the current arrow, javelin and dart games of western native Americans, (2) determining the geographical spread of the games among the culture areas and tribes, (3) determining the characteristics of the various games, and (4) determining the presence of missile games in the current mythology of the tribes. Data for this investigation were researched from the Seattle photo-artist Edward S. Curtis' twenty volume work, The North American Indian, a thirty year effort to record the customs and character of the western American Indian during the early twentieth century. Curtis' volumes revealed that of the eighty tribes he observed, forty currently possessed arrow, javelin, and/or dart games. Tribes within the Great Plains, California, and Northwest Coast culture areas were most likely to have been currently playing such games. Of the three types of missiles used, arrows and javelins were most common. The arrow, javelin, and dart games were of three general types in Curtis' accounts. The most common type was the wheel and missile game where the target to be struck was the rolling wheel. Also common was the contest with a fixed target. Games where the missile was shot or thrown for distance were least common. Each type of game was played with a strong degree of similarity within the several culture areas. Of the scores of currently told myths Curtis included in his works, few contained reference to arrow, javelin, and dart games. All but one reference came from the mythology of tribes from the Great Plains culture area. Within the oral tradition of the Plains Indian, such games had been present in the culture from early times.

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March 27, 1977
3:00 pm

COMPETITIVE SPORT AND THE "CULT OF TRUE WOMANHOOD": A PARADOX AT THE TURN OF THE CENTURY. Mary Lou Squires, Texas Woman's University.

The focus of the study was on the period from 1890 to 1910 when competitive sport for college women developed in the eastern women's colleges. The investigator hypothesized that Louisa May Alcott was a major influence in popularizing a new image for women. Observers of the social scene and contemporary critics commented on Alcott's social action efforts as well as her influence on the young after the 1868 publication of Little Women. Alcott supported vigorous exercise and rational dress for women and depicted a lifestyle that encouraged participation in competitive sports. The investigator examined contemporary periodicals and accounts of the period to establish the societal expectations for women. Findings suggested that the main role for woman was that of wife and mother; however, increased opportunities for education encouraged women to engage in professional endeavors and volunteer activities. Society recognized teaching as the most acceptable profession open to women. The eastern women's colleges were instrumental in upgrading the teaching profession for women. These prestigous colleges offered a liberal arts curriculum but most students had professional ambitions that differed from the societal ideal. College women were constantly admonished to remain "winsome and womanly", and it was within these limits that the challenge of competitive sport was accepted, as had been the challenge of rigorous scholarship for women. College authorities supported sports participation as a way to insure physical fitness in students. Society began to recognize the importance of healthy, intelligent mothers to the well-being of families, and an idea espoused by the colleges, "the whole-hearted, rosy- cheeked girl who played for the joy of playing" sought acceptance. Graduates of eastern women's colleges took positions in colleges, preparatory and secondary schools throughout the country and they spread this revolutionary idea of sport for girls and women. Based on the findings of this study, it was concluded that students at the selected women's colleges served as a socio-cultural bridge between the past and the future. The restraints of the past were reflected in the dress and playing rules of the new sports for women; whereas, the freedom of the future were reflected in competition, team-work, and vigorous activity. Alcott had presented this socio-cultural bridge in fiction before it occurred in life. Her heroines were free, independent, and vigorous women who remained "old fashioned girls"--womanly, loving, and loveable.

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March 27, 1977
3:15 pm

THE 1922 PARIS TRACK AND FIELD MEET: EFFECTS OF COMPETITION ON AMERICAN WOMAN. Paula D. Welch, University of Florida.

The primary purpose of the study was to determine the effects of America's first distaff entry in international track and field competition. Specifically, the August, 1922 track and field meet and its effect on women's competition in the United States was analyzed. Data for this investigation were gathered from pertinent literature, interviews, newspaper articles and minutes of the Amateur Athletic Union of the United States. Dr. Harry E. Stewart was responsible for gathering the American team that competed in Paris. Stewart, President of the National Women's Track Athletic Association was a leading proponent of women's track and field in this country. The athletes competed without the approval of most women physical educators in the United States. The Committee on Athletics for Women of the American Physical Education Association disapproved of the Paris meet because track and field for women was new and loosely organized. The committee did not believe that American track and field participants warranted international exposure because a national team could not be properly chosen from the haphazard programs. Among the formal objections were those voiced by the American Physical Education Association, the Playground and Recreation Association and the Women's Division of the National Amateur Athletic Federation. The most frequently voiced objections to highly organized sport focused on: 1) overexertion during competition, 2) limited opportunities for a few skilled participants and 3) exploitation of athletes. After the 1922 Paris track and field meet, concern regarding the effects of competition was reinforced when it was learned that a number of contestants showed severe exhaustion after their competition. At least one American competitor was unable to enter some of the events because of illness associated with training. Results of this investigation indicate that the Amateur Athletic Union became interested in controling women's track and field in the United States after the 1922 Paris meet. In addition, the American entry in Paris was partially responsible for the first meeting of the Women's Division of the National Amateur Athletic Federation and its subsequent platform. Finally, the meet was a factor in the Olympic protest and influenced the curtailment of women's collegiate competition in the United States.

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March 27, 1977
3:30 pm

GAMES OF CHILDREN AND YOUTHS IN THE ANCIENT WESTERN WORLD.

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The present study was to examine the extent of children's and youth's games in the ancient western world. Literary and archaeological evidence were utilized, as well as visitations to the major museums and archaeological sites represented in the study. The following civilizations were examined in the study: Sumerian, Hittite, Assyrian, Iranian, Egyptian, Minoan-Mycenaean, Greek, Etruscan and Roman. The time period covered was, roughly, from 4000 B.C. to 600 A.D.

It was concluded that the following children's activities were in evidence. Sumerian - toys (model chariot and boat). Hittite - dice or knucklebones, top, toys. Assyria - in the early education of the King he was trained in riding a horse, archery, throwing lances, chariotry and holding the shield, hunting; other activities were dice, toys. Iranian - archery, spear throwing (contests were held in these), running, pentathlon, riding, jousting, hunting, falconry, toys. Egyptian - swimming, acrobatics and gymnastic games, standing on a partner's back, yoga or running on knees, wheeling or spinning game, tug of war, pick-a-back, playing on father's back, kicking game, hoop trundling, guessing games, balls, shell game, throwing games. Minoan-Mycenaean - knucklebones, toys, swing, "house." Greek - dancing, running, jumping, ball-playing, wrestling, javelin, discus, jumping, kicking buttocks with heels, swimming, boxing, pancration, archery, hunting, bare-back riding, toys, dolls, rolling the hoop, fishing, bouncing a ball on the knee, diving, ball game with youth on another's shoulders, blind man's buff, pick-a-back, swinging, see-saw, morra, string game, dice, knucklebones. Etruscans - javelin throwing, acrobatics, tops. Roman - model chariots, hunting, hoop play, mut games, toy houses, odd-and-even, riding a long stick, tops, knucklebones, buffet (sticking game), acrobatics, horse riding, harnessing mice to a small chariot, pick-a-back, fishing, boating, toys, playing with pets, "jar" game, see-saw, kite flying, games of chance, blind man's buff.

It is not meant to be inferred that these were the only games played by children and youths in the ancient western world, rather that these are the activities supported by literary and archaeological evidence. Slides will be utilized to demonstrate much of the evidence.

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March 27, 1977
3:45 pm

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USING GROSS-MOTOR ACTIVITY TO IMPROVE LANGUAGE ARTS CONCEPTS BY THIRD GRADE STUDENTS. Kenneth A. Penman; Jon R. Christopher; Geoffrey S. Wood; all authors Washington State University.

The objective of this investigation was to test the hypothesis that enjoyable motor activity, when associated with cognitive learning, produces an increase in the ability of third grade students to acquire language arts skills. Two third grade classes were taught language arts skills using passive and active games. One experimental group used active games and the second experimental group used passive games. A games period of 4 weeks preceded by a pre-test and finished with a post-test, was used to teach the classes the necessary capitalization skills listed in the curriculum. Each class was given 30 minutes of games, 4 days a week, over the 4 week period. The same procedure was duplicated for teaching the concept of punctuation, however the active and passive groups reversed roles while learning the second concept. The group that was taught capitalization skills by active games, was now taught punctuation skills through passive games. A third class acted as a control group in that they were taught the same skills in the "traditional" manner. Six active and 6 passive games were developed for the two language arts concepts of capitalization and punctuation. Analysis of covariance was used to compare post-test means. At the end of the first 4 week capitalization unit there was no significant difference in learning between the passive game class and the control class. There was a significant difference in the learning of the active game class compared to the passive and control classes. At the end of the 4 week punctuation unit there was a significant difference between all 3 groups. Analysis of covariance was also used to compare performance for retention. Only one group, the passive games class in punctuation, had a significantly better retention rate. It can be concluded that learning was greater when games were used.

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March 27, 1977
4:15 pm

CHILDREN'S DOMINANCE AND DIRECTIONAL AWARENESS AS A FUNCTION OF CHRONOLOGICAL AGE. Barbara Clifford, California State Polytechnic University at Pomona; Dr. Stanley Bassin, advisor.

The purpose of this study was to determine if the development of dominance, or preference, of eye, hand, and foot as well as directional awareness ability was a function of chronological age. The 138 boys and girls were grouped by ages 7, 9, and 10, and were matched according to sex. They were distributed so that each group had 23 pairs of subjects. The motor behavior testing included three tasks with three trials per respective task, equal to 36 response opportunities for eye, hand (supervised), hand (unsupervised), and foot. Eye preference appeared to have been already established by age 7 for 95% of the subjects. Hand preference had not been clearly established at age 10, but did increase as a function of chronological age from 62% at age 7 to 82% at age 10 with unsupervised skills as a criterion measure. When supervised skills were used as the criterion measure, over 95% of the subjects demonstrated a consistent hand usage by age 7. Foot preference was established by age 10 for 37% of the youngsters. Both hand and foot scores were influenced by tasks and inter-task performance. Discriminatory power was greater for the intra-task method than the single trial method for assessing hand and foot preference. Directional awareness results indicated a statistically significant developmental pattern as a function of chronological age ($\chi^2=7.78$ $p<.05$ $df=1$). The results of this study led to the following conclusions: (1) Eye preference and directional awareness appear to be established by early childhood, and (2) Task selection influences the determination of youngsters hand and foot preference, and (3) Intra-task reliability appears to be more accurate in assessing hand and foot preference than the use of single trial tests.

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March 27, 1977
4:30 p.m.

EFFECTS OF OBSERVER SEX AND INFORMATIONAL - MOTIVATIONAL COMPONENTS OF MODEL'S DEMONSTRATION ON MOTOR PERFORMANCE.

Deborah L. Feltz, Plymouth State College; Daniel M. Landers, Pennsylvania State University.

The effects of the informational and motivational components of a model's demonstration on motor performance were investigated. A secondary aim was to examine the effects of observer sex on observational learning. Male and female fifth- and sixth-grade students (N=80) were compared under four conditions comprising the presence or absence of informational and/or motivational cues using the Bachman ladder-balance task. Access to informational cues was manipulated by means of a model demonstration. Motivational cues consisted of a model providing subjects with verbal KR of model's prior task performance. Results of the Sex x Informational Cues x Motivational Cues (2 x 2 x 2) ANOVA indicated that males had higher average performance scores than females. These differences, however did not appear to be due to greater modeling by males. Subjects receiving a model demonstration had higher performance scores than subjects not given a model demonstration. The results were interpreted as providing evidence for the informational component as the primary element in affecting motor performance.

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March 27, 1977
4:45 pm

HOW, WHEN, AND WHERE TO USE DEMONSTRATIONS: SUGGESTIONS FOR THE PRACTITIONER. Donna M. Landers, The Pennsylvania State University.

The purpose of this paper was to review literature that discussed a number of variables that are important to consider when performers learn by means of a demonstration. Specifically, the research evidence was interpreted for the practicing teacher. In physical education, teachers rely most often on teaching by demonstration so the material, performance of a motor skill, is observationally learned by the student. In order to successfully perform a motor skill, the learner must attend to and retain the important aspects of the demonstration. Motor reproduction or performance of the skill improves with practice but is initially dependent upon the strength, timing and coordination of the learner. The research evidence from investigations conducted in controlled conditions on video-tape replay, demonstration and loop films provides the practitioner with many important points that are invaluable when attempting to teach motor skills by means of a demonstration, filmed or live. This information may enable instructors to better judge the effectiveness of films they may wish to purchase or perhaps make themselves. When a film is used to demonstrate a motor skill, certain attention-directing devices can enhance observational learning. Techniques such as narration, slow-motion, filming angle (subjective or objective), close-ups, and others were discussed in relation to their highlighting relevant aspects of a skill to be acquired by the learner. Suggestions for dividing motor skills or sequences into segments so the learner can attend to more important aspects of a skill were provided. Ways in which the learner can better remember what he attended to, such as mental rehearsal, were discussed with an emphasis placed on maximizing retention. Finally, the reasons for providing demonstrations that "fit" the developmental level of the child, cognitively and motorically, were explained. Many examples were supplied throughout whenever technical research evidence was reported.

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March 27, 1977
5:00 pm

A PALMAR SWEAT BOTTLE MEASUREMENT AS AN INDEX TO COMPARE CHILDREN'S PHYSIOLOGICAL REACTIONS TO COMPETITIVE AND PROBLEM-SOLVING ENVIRONMENTS. Allan Rupnow, Iowa State University.

The activation levels of 120 fourth and fifth grade children were collected via a relatively new physiological measurement called the Sweat Bottle Measure. This measure was used to determine palmar sweating of subjects involved in different teaching strategies. In this method a small plastic bottle container of distilled water is inverted on a fingertip for five seconds, then capped. Sweat ions are collected and increase the conductivity of the bottle's contents: the more sweat collected, the greater the conductivity. Conductivity is measured at some convenient later time by inserting an electrode holder with electrodes into the bottle and recording the voltage drop across the solution. Reciprocals of the voltage readings then express palmar sweat level in conventional conductance terms. The teaching settings during which sweat samples were collected were problem-solving and competitive situations. The problem-solving approach consisted of exploring and inventing different ways of moving with/on small and large apparatus; while the competitive approach consisted of participating in contests and races with/on small and large apparatus. The collected sweat samples reflected the subjects' sweating prior to the skill or game phase of an elementary physical education class. The dependent variable, method of teaching, was alternated each session and repeated a total number of six times for all the 120 subjects studied. The experimental environment (elementary school gymnasium) was controlled to reflect constant room temperature, lighting, and indoor conditions in Iowa's mid-winter season. Sweat bottle readings for the three competitive periods were averaged, as were the readings for the three problem-solving periods, for those subjects (N=110) with complete data. A split-plot analysis of variance (ANOVA) examined the effects of palmar sweating on Sex (male versus female), Method (problem-solving versus competitive) and the Sex-by-Method interaction. While the split-plot ANOVA Sex and Sex-by-Method were nonsignificant, the Method effect was highly significant: $F(1,108) = 110.81$, $P < .001$. It was concluded that fourth and fifth grade children of both sexes exhibited more palmar sweating under competitive conditions than under problem-solving conditions. It was also concluded that the sweat bottle measure is a useful technique for collecting physiological information, especially in a natural class setting and particularly with children from a standpoint of testing efficiency.

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March 27, 1977
5:15 pm

THE EFFECTS OF CRYOKINESTHESIA UPON MOTOR PERFORMANCE. Lynn A. Simon, Ohio University.

Problem. This study attempted to determine the effect of partially blocking elbow and knee afferent receptors from cortical control by localized hypothermia during the performance of simple motor skills.
Procedures. Six women graduate students, majoring in physical education, were tested in dart throwing and soccer kicking under normal conditions and under cryokinesthetic conditions. Each subject performed 10 throwing trials and 10 kicking trials under normal conditions. After ice applications of approximately one-half hour, each subject repeated the 10 throwing trials and the 10 kicking trials. Measurements, from electrogoniograms, were taken for accuracy, range of motion, time of performance, and the velocity of performance.
Findings. Ice application for 30 to 37 minutes on the elbow and knee joints produced a drop in skin temperature of between 18 and 27 degrees Centigrade. During prolonged ice application, skin temperatures alternated between cooling and warming. Apparently circulatory activity tended to cause a warming trend periodically. Subjects reported a loss of sensation in the iced joint and were unable to judge the precise movement occurring in that joint. Accuracy decreased on throwing and kicking skills after ice application. In 12 performances of throwing and kicking, range of motion was decreased in nine and increased in three of the performances after ice application. During the 12 performances, six throwing and six kicking, time of execution was decreased in eight and increased in four during the cryo-kinesthetic condition. Linear velocities were slower when the joints were cooled in all 12 performances. There appeared to be no correlation between the degree of joint cooling and the decrement in performance.
Conclusions. The decrement in the performance of selected throwing and kicking skills under cryokinesthetic conditions indicated that afferent joint receptors in the elbow and knee joints are important in motor performance. Cryokinesthesia appeared to be an effective technique for blocking afferent nerve impulses from cortical control. Subjective reports of the individuals in this study indicated that elbow and knee joint afferent receptors were important in kinesthetic perception.

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March 27, 1977
5:30 pm

INTERACTIVE EFFECTS OF RESISTANCE AND FACILITATION PATTERNING UPON REACTION AND RESPONSE TIMES. Paul R. Surburg, The University of West Florida.

The purpose of this study was to determine the interactive effects of different amounts of resistance with proprioceptive facilitation patterning upon reaction, movement and response times. Fifty subjects from The University of West Florida participated in this study. Reaction time, response time-one, response time-two and movement time (response time-one minus reaction time) were measured prior to and following training sessions. Response time-one was the interval from the onset of a light stimulus until the following was accomplished: wrist flexion; elbow flexion and supination; shoulder flexion, adduction and external rotation. Response time-two measured the elapsed interval taken to move 48 cm. in a shoulder flexion, elbow extension pattern. Subjects were randomly assigned to one of the following training groups: weight training, proprioceptive facilitation patterning (PNF) without resistance and proprioceptive facilitation patterning with maximum resistance. The weight training group did ten repetitions maximum of arm curls each session. Subjects in the PNF without resistance group executed ten flexion-adduction-external rotation patterns of the upper extremity each session. The PNF group with maximum resistance followed the same procedure as the other PNF group with the exception that an assistant applied maximum resistance to all sequences. All subjects engaged in their training program three times a week for six weeks. ANOVA revealed no significant differences between training groups. Within the limitations of this study proprioceptive facilitation patterning without resistance or with maximum resistance did not cause significant changes in reaction time, movement time and response time.

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March 27, 1977
5:45 pm

MEASURES OF BODY COMPOSITION AND PERFORMANCE IN MAJOR COLLEGE FOOTBALL PLAYERS. Edmund J. Burke and Harold H. Morris, Ithaca College; Edward Winslow and William V. Strube, Syracuse University.

The purpose of this study was to ascertain the effectiveness of selected performance and body composition measures as indicators of the changes that occur to major college football players as a result of participation in an off season conditioning program. Forty-eight prospective members of the Syracuse University football team trained three days per week for a period of eight weeks during the winter months of 1975. Included in the training program were isokinetic concentric and eccentric exercises. During the final six weeks of training, a 45-min circuit training program was added to the conditioning routine, which included: 12 min of steady state running, a series of all-out sprints, and a series of football specific "agility" exercises. Performance tests administered prior to and following the program included the mile run, and maximum weight lifted for the bench press and the leg squat. Skinfold calipers were used to measure subcutaneous fat at six regions of the body. Body density and lean body mass were predicted employing a regression equation by Pascale. An analysis of the results of a multivariate analysis of variance indicated that a weighted vector of pretraining performance and body composition measures differed significantly from a similar value based on post training assessment. The vector asscciated with the greatest characteristic root was analyzed to ascertain those variables that were most susceptible to change as follows: body density, 1.006 to 1.007; percent body fat, 16.79 to 16.02; fat weight, 35.62 to 34.10 lbs. Employing post test performance and body composition measures and the 40 yard dash, stepwise multiple discriminate function analysis was employed to determine the percent of proper classification of performance as: starters, players who did not start or non-players during the subsequent 1975 football season. Of the 16 starters: 11 were properly classified, one was classified as a player and four were classified as non-players. Of the 16 non-starters: four were classified as starters, 11 were classified properly and one was classified as a non-player. Of the 16 non-players three were classified as starters, three were classified as non-starters and 10 were properly classified. Thus, the discriminate function properly classified 67 percent of the players into their respective groups.

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March 28, 1977
9:00 am

VALIDITY OF BODY COMPOSITION PREDICTION EQUATIONS IN UNDERFAT, NORMAL FAT, AND OVERFAT FEMALES. V. Katch, F.I. Katch, and S. Sady. Physical Education Departments, University of Michigan and Queens College of the City University of New York.

Criterion lean body weight and percent body fat data were obtained on 25 underfat ($<$ 20% fat), 34 normal fat (20-30% fat) and 17 overfat ($>$ 30% fat) female subjects. In addition 5 skinfold, 9 diameter, and 17 girth measures were taken. Step-wise multiple linear prediction equations with percent fat as the dependent measure, and skinfold, diameter, girth measures, age, body weight, and height as the independent measures were computed. For all three groups the girth measures yielded the highest multiple $\underline{R}$'s ($>$ .90) with the smallest errors ($<$ $\pm$ 3% fat). Cross validating the individual equations between the groups revealed substantial errors ($>$ $\pm$ 5% fat, $\underline{R}$'s = $<$ .75. Also three published equations were validated on each group. Large errors resulted ($>$ $\pm$ 7% fat, $\underline{R}$'s = $<$ .70). The data indicate the necessity to use percent body fat-body size-specific equations when attempting to predict percent body fat in females.

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March 28, 1977
9:15 am

SKELETAL MUSCLE FIBRE COMPOSITION AND BIOMECHANICAL ASPECTS OF PERFORMANCE. Paavo V. Komi, University of Jyväskylä (Finland).

Human skeletal muscle fibre composition has been shown to be genetically determined (Komi, et al. 1976) and to influence strongly such a measurement of physiological performance as aerobic power (Rusko, et al., 1976). This study was designed to investigate the relationship between muscle fibre composition and frequently used biomechanical performance measure, the vertical jump. By using the routine biopsy technique, samples were taken from the vastus lateralis muscle of 33 college male students. Histochemical staining method (ATPase) was used to classify the muscle fibres as slow (ST) or fast twitch (FT) fibers. Each subject performed a vertical jump on a force platform both from a static (SJ) and a free position with counter movement (CMJ). In both conditions the hands were kept on the hips during the entire movement. The data indicated that in SJ the various parameters of the force platform record - height of rise of the center of gravity, mechanical power, average force and net impulse - were all significantly ($P<.01$) related to the muscle fibre composition. Individuals with a higher percentage of FT fibers were characterized by better performance on all of these measures. Similarly in CMJ-condition the height of rise of the center of gravity and net impulse were positively ($P<.01$) related to % FT fibres. The results are in agreement with earlier findings on force-velocity (Thorstensson, et al., 1976) and force-time (Viitasalo and Komi, 1976) measurements. It is concluded that the skeletal muscle fibre composition is an important structural parameter influencing the biomechanical aspects of performance.

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March 28, 1977
9:30 am

CHANGES IN BODY COMPOSITION AND STRENGTH OF WOMEN BASKETBALL PLAYERS DURING THE BASKETBALL SEASON

Nancy Oyster, Colorado State University

Subjects were 19 volunteers from the Ohio State University Women's championship basketball team that won the Midwest regional tournament. Measurements were taken before and after the season. Skinfold measures included iliac crest, triceps, subscapular, calf. Body density and percent body fat were computed using the Sloan-Weir nomogram. Girth measurements of biceps (flexed and relaxed), lower arm (contracted and relaxed), deltoid (abducted), chest (inspired and relaxed), thigh, and calf were taken. Strength measures included ankle plantar flexion, hip flexion and shoulder flexion and the strength composite of these measures. Pre- and post-test means and standard deviations were calculated for each of the 27 variables. The pre-test strength composite mean of 323.4 was below average when compared with Becker's norms on college women (T=47). The post-test mean of 431.61 was at T=60. There was a 33 percent gain in strength. Decreases in muscle size rather than hypertrophy occurred during the basketball season. Strength gains occurred in the lower extremity measures and shoulder flexors, whereas slight losses occurred in the upper extremity measures. Decreases in skinfolds occurred in all measures except the measure taken at the iliac crest. Since this measure was used in the reading of percent body fat from the nomogram, the body fat increased also. MANOVA between pre- and post-tests showed significant changes in muscle girth in all measures (flexed and relaxed) of the upper and lower arm, chest, and calf. All changes were decreases in muscle girth, not hypertrophy. Much of the decrease in muscle girth may be accounted for by loss of fat as evidenced in the significant decreases in the subscapular and triceps skinfold measures. The skinfold measure at the iliac crest increased significantly. This increase is reflected in the increase in percent body fat (sig.,.05). Weight remained the same. None of the upper extremity strength losses was significant. However, as would be expected from an endurance training program, lower extremity strength measures showed significant gains. Since the strength composite is the sum of ankle plantar flexion, hip flexion and shoulder flexion, it too, showed a significant increase.

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March 28, 1977
9:45 am

RELATIONSHIPS OF SOMATOTYPE AND BODY COMPOSITION TO PHYSICAL PERFORMANCE IN 7 TO 12 YEAR OLD BOYS. M. H. Slaughter; T. G. Lonman; J. E. Misner, University of Illinois at Urbana-Champaign.

The purpose of this study was to determine the association of somatotype, body composition, and physical performance in 7 through 12 year-old boys. Two relatively new objective methods of measuring somatotype, Sheldon's trunk index method and Heath-Carter's anthropometric method, were used. Body composition was estimated as fat and lean body mass from ^{40}K measurement, using a whole-body counter, and from two skinfold thickness measures. Physical performance measures consisted of three tests of running (mile run, 600-yard run and 50-yard dash) and two tests of jumping (standing broad jump and vertical). Body size variables (height, weight, and LBM) showed moderate to low degrees of association with tests of running performance (.04 to -.66) and moderate degrees (.32 to .64) of association with the two jumping events. Per cent fat correlated positively with running performance (.37 to .53) and negatively with jumping (-.41 to .44). In general, somatotype components had lower correlations with running and jumping variables than body composition (per-cent fat) or body size variables such as height and weight. Heath and Carter's third component, derived from the inverse ponderal index, was correlated more closely with performance scores than other components of somatotype. Somatotype components in combination with each other or with body size and composition variables in multiple regression analysis showed little association with running performance and some association with jumping. Mesomorphy (trunk index method) and second component (Heath and Carter's anthropometric method) were the least significant somatotype components as indicated by the standardized regression coefficients. In conclusion, somatotype components, especially the second component and mesomorphy, are not closely associated with physical performance measures in children. One possible explanation for the lack of influence of Sheldon's mesomorphy and Heath and Carter's second component is that neither component may be closely related to LBM. In work with adults and children we have found little relation of somatotype to LBM. Furthermore, we have found in children the second component to be influenced by the degree of fatness, with obese children obtaining high second component values. Further study into improved objective systems of measurement of body structure and somatotype is needed.

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March 28, 1977
10:00 am

THE EFFECTS OF WATER IMMERSION ON LUNG VOLUMES: IMPLICATIONS FOR BODY COMPOSITION ANALYSIS. Robert A. Wiswell, University of Southern California; John G. Mohler, Los Angeles County Medical Center; Gary T. Romero, University of Southern California.

Lung volumes of twenty healthy young men were measured before and after water immersion to the neck level. Immersion resulted in significant decreases ($P<.01$) in forced vital capacity (FVC) (8.9%), expiratory reserve volume (ERV) (61%), total lung capacity (TLC) (5.6%) and functional residual capacity (FRC) (29%). Significant increases were observed in inspiratory capacity (IC) (10%) and residual volume (RV) (6.7%). The increase in RV was attributed to a possible "stiffness" of the lung tissue caused by pulmonary vascular engorgement. Densitometric analysis was made on each subject using hydrostatic weighing techniques. Subsequent calculation of body density and percent body fat indicated significant ($P<.01$) differences when using RV measured on land and in water. It was concluded that when obtaining body density values, RV should be measured concurrently while the subject is in the water.

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March 28, 1977
10:15 am

THE EFFECTS OF SELECTED FORMS OF VISUAL OBSERVATION ON THE EARLY LEARNING OF A GROSS MOTOR TASK. Joanne H. Bell and Charles J. Ansorge, University of Nebraska-Lincoln.

In order to determine the effects of selected forms of visual observation on the early learning of a gross motor task, 82 female undergraduate volunteer subjects from physical education activity classes at the University of Nebraska-Lincoln were randomly assigned to one of four groups: (1) video tape, (2) loop film, (3) co-action, and (4) alone. All subjects performed ten 15-second familiarization trials on a stabilometer. Two to three days after their familiarization trials, the subjects performed ten trials under the experimental conditions of their assigned group. Subjects in the video tape group (N = 20) performed ten 15-second trials with 45 seconds between each trial during which time they viewed a video tape replay of their previous trial performance. Subjects in the loop film group (N = 20) viewed an 8mm loop film of an expert performer during the 45 seconds rest period between each of their ten 15-second trials. In the co-action group (N = 20), two subjects alternated their trials until each had completed ten 15-second trials. Subjects in the co-action group viewed each other's performance during their 45-second rest period. Subjects in the alone group (N = 20) performed ten 15-second trials and were instructed to think about their previous trial performance during their 45-second rest intervals. The time in balance scores for each subject were converted into three means: Block I (mean of trials 2,3. and 4), Block II (mean of trials 5, 6, 7), and Block III (mean of trials 8,9, and 10). A Blocks X Groups (3 X 4) ANOVA was applied to the data. Data were analyzed at the .05 level of significance. No significant difference was found among the group means; however, performance did improve significantly across the blocks of trials. It was concluded that insufficient evidence was available to show that any one of the selected forms of visual observation had any more effect on stabilometer performance than any other.

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March 28, 1977
9:00 am

85 91

PRECONDITIONED CUES OF PERFORMANCE: EFFECTS ON ACQUISITION OF A SERIAL MOTOR TASK. Mary E. Bowden, The University of Toledo.

The problem considered in this study was whether the efficacy of information feedback in serial motor performance is a function of interpretation of the feedback. It was postulated that young subjects receiving speed and form cues via previously neutral stimuli, which had become meaningful by preconditioning, would perform a serial task faster and more efficiently than subjects who received the same cues without prior differentiation. Thirty girls and thirty boys, each ten years of age, were randomly assigned to one of five treatment groups and performed a simulation of the forehand and backhand strokes used in racquet sports. Presentation of stimuli for the movement and recording of subject responses was accomplished by a PDP-9 digital computer linked with a TR-48 analog computer. Provision of preconditioned supplementary feedback cues emphasizing form alone produced slower reaction and response times, but more accurate responses, and these effects persisted even when supplementary feedback was discontinued. Simultaneous emphasis on both form and speed produced no decrement in reaction or response times and, when both form and speed were stressed, the number of errors approximated that occurring when form alone was emphasized. Therefore, both form and speed cues are necessary to produce the best performance i.e., fast, accurate responses.

Dr. Mary E. Bowden
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March 28, 1977
9:15 am

RESPONSE CHARACTERISTICS OF SUBJECT-DEFINED AND EXPERIMENTER-DEFINED MOVEMENTS IN MOTOR SHORT-TERM MEMORY. Robert W. Johnson, University of Minnesota; John F. McCabe, Dalhousie University.

The purpose of this study was to investigate the response characteristics of subject-defined (S-defined) and experimenter-defined (E-defined) movements in motor short-term memory. Twenty-six male and two female volunteers were alternately assigned to one of two experimental groups. Subjects (Ss) assigned to Group S performed a series of 12 S-defined (voluntary, preselected) movement reproductions whereas Ss in Group E performed 12 E-defined (constrained) movement reproductions. Reproduction responses were made under conditions of immediate recall. Deviations from the criterion target position were converted into algebraic error (CE), absolute error (AE) and variable error (VE) statistics. For purposes of analysis reproduction responses were categorized (on the basis of their criterion movement lengths) into three sectors representing short, medium, and long movement reproductions. Analysis of the AE revealed a significant group effect indicating the superior recall of S-defined movements. Analysis of the CE and VE scores revealed no significant differences between groups, no sector effect, and no interaction. Velocity time-curves and displacement-time curves were recorded for each movement production and reproduction. From these recordings the following parameters were recorded and analyzed: (1) the movement time (MT); (2) the maximum velocity occurring during the movement (VMAX); (3) the relative position at which maximum velocity occurred (RVEX); (4) the velocity changes occurring within the first quarter of the movements (VQ1); (5) the velocity changes occurring within the mid-section of the movement (from a position one-quarter into the movement to a position three-quarters into the movement) (VM); (6) the velocity changes occurring within the final quarter of the movement (VQ4). No differences were found between the criterion movement (CM) and reproduction movement (RM) parameters for Group S with the single exception of parameter VM. The movement type x sector interactions were nonsignificant for all parameters. In the case of Group E significant movement type x sector interactions were found for parameters MT, VMAX, RVEX, VQ1, and VQ4. These data were interpreted as suggesting that while S-defined Ss performed similar movement sequences in the CM and RM, E-defined Ss did not and this variation may have influenced the accuracy of recall.

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March 28, 1977
9:30 am

PROCESSING DEMANDS DURING THE ACQUISITION OF A MOTOR SKILL USING VISUAL FEEDBACK CUES. T. Gilmour Reeve, Texas A & M University.

The purpose of this study was to determine the processing demands of visually controlled movements during skill acquisition. Fifteen subjects learned a linear positioning movement to a criterion location during 80 practice trials. For the production of the self-paced movement, subjects had visual feedback cues for controlling the response. The secondary task reaction time probe technique was used to determine the processing demands at four probe positions defined as the Initiation Probe, Movement Probe I, Movement Probe II, and the Termination Probe. A Random Probe and non-probed practice trials were included to insure that the subjects did not identify a regular pattern of probe presentation. A base reaction time was determined for each subject. Within group, Subject X Trials analyses of variances were conducted in order to determine the following: (1) shifts or decreases in processing demands with practice, (2) those phases of movement requiring attention, and (3) those phases of movement control that were processed automatically. Automation of a response was operationally defined as those probe reaction times that were not significantly different from the base reaction time. The four within group analyses of variances were each significant ($p < .01$), indicating changes in the attentional requirements of the motor responses. The Student-Newman-Kuels test was conducted to identify significant differences between the probe and base reaction times. The results demonstrated that decreases in processing demands occurred with practice on the primary task. For the visual feedback location movement, an open-loop, non-attention demanding mode of responding developed during the learning trials that controlled the response at the Initiation Probe and Movement Probe I positions. A closed-loop, process demanding mode of responding controlled the movement at the Movement Probe II and Termination Probe positions. Thus, the process of subjective reinforcement, requiring error detection and correction, demanded processing capacity in the regulation of self-paced motor responses.

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March 28, 1977
9:45 am

BILATERAL TRANSFER OF A MOTOR PROGRAM, Diane C. Shapiro, University of Southern California.

The present experiment was an attempt to confirm some of the previous findings on the characteristics of a motor program and determine if the programmed movement could be transferred bilaterally to the hand that never practiced it. Subjects learned to rotate a lever seven times to four different locations in a specified amount of time and the total duration of the movement sequence was 1600 msec. At the conclusion of the fifth practice day, the testing trials began. This consisted of 15 trials where the pattern was to be reproduced from memory, 15 trials where the goal was a maximum reduction in movement time disregarding the temporal constraints the subjects were trained on, and then 15 trials with the opposite hand. The test trials were subjected into a MANOVA, with the dependent variables consisting of the proportion of time to traverse to each location. The Multivariate F comparing the trials reproduced from memory, the speeded-up trials and the trials performed with the left hand was not statistically significant, $F(12,6)=1.174$, $p<.50$. Although the subjects never performed the task with their other hand and were never aware that they would be asked to do so, they were able to perform it keeping the relative timing the same. This suggested that the program is not limb specific and can be generalized to other limbs. Timing was again found to be an inseparable part of the motor program and that the program can last longer than one reaction time.

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March 28, 1977
10:00 am

SYMBOLIC PERFORMANCE MODELS IN MOTOR SKILL LEARNING, Rainer K. Stenius, University of Oregon.

The effects of two selected auditory action feedback conditions as compared to a form of visual action feedback, were studied to ascertain acquisition and performance of a novel guided curvilinear motor act called the Stentrack. Twenty-one male and fifteen female undergraduate and graduate volunteer students were randomly assigned, according to gender, into three experimental groups. The Stentrack apparatus resembled a table upon which a steel monorail was secured. A specially designed trolley with a tension sensitive wheel mechanism, housing a frequency sensitive transducer, was capable of negotiating the monorail with negligible friction. The initial arc portion of the monorail measured twenty-one inches in diameter and the linear length of the total movement was forty-one inches. The electronic instrumentation attached to the transducer was capable of eliciting various visual displays related to movement speeds of the trolley. In addition, frequency variations were converted into qualitative electronic sound patterns for auditory discrimination. Visual and auditory criteria were concurrently performed by the investigator (E) and displayed on an oscilloscope screen, or ear phones via a cassette recording, for respective sensory discrimination. The movement model lasted for 1.955 seconds and included an initial acceleration followed by a deceleration pattern. Sixty criterion sound models were presented to the auditory experimental group (AXP) while these Ss were seated in front of the Stentrack in an attempt to develop a cognitive set of the task. The auditory control (ACO) and visual (VIS) groups did not receive respective pre-modeling. Subsequently, all Ss performed ten trials per session, with a total of eight sessions, conducted twice a week for four weeks. Mean integrated and algebraic error scores were computed, constituting seven dependent variables, and subjected to ANOVA procedures involving planned comparisons between groups. The .05 level of confidence was accepted as the criterion for significance. Results, as measured by mean integrated error scores, did reveal a significant groups main effect ($F;1,19=5.54$ $p<.05$) and groups x sessions x gender interactions ($F;7,133=2.30$ $p=.03$) in the VIS-ACO comparison only. Simple interaction analysis implied a more consistent treatment effect for the VIS group. Trend analyses were basically quadratic in nature exhibiting acquisition. Mean algebraic error scores, measuring temporal and amplitude judgments, indicated a pervasive perceptual difference only on the peak amplitude variable between sense modes. Symbolic modeling of motor tasks seem to have promise and should be further investigated.

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March 28, 1977
10:15 am

AGE-RELATED DIFFERENCES IN RESPONSE DECISION PROCESSING.

Jane E. Clark, University of Iowa.

Previous research has shown that young children are slower than older children and adults in the performance of time-dependent motor tasks. The purpose of the present investigation was to test the hypothesis that the observed age differences may be attributable, at least in part, to age differences in processing response decisions. Using an information processing paradigm, two response demand variables (spatial stimulus - response compatibility and response discriminability) were selected as variables which affect one of two stages of response decision processing. Fifty-six subjects from three age groups (6-, 10-, and 21-year olds) performed a two-choice reaction time task under either a high or low level of each of the response demand variables. If there are developmental changes in response decision processing, then as the response demands are made more difficult (i.e., the low level), reaction time (RT) will increase more for the younger than older subjects. A 2 x 2 x 3 (compatibility x discriminability x age) ANOVA on mean RTs showed main effects for age and compatibility ($p < .01$). Response discriminability did not significantly affect RT performance of subjects of any age group tested. Analysis of the planned pairwise age group contrasts under each of the response demand variables revealed significant differential effects of spatial S-R compatibility on the age groups. No such age-related differential effect was found for response discriminability. Within the information processing paradigm selected the results of the present study support the hypothesis that age differences in time-dependent motor tasks may be attributable, in part, to age differences in processing response decisions. The support for this hypothesis is limited, however, to only one stage of response decision processing, i.e., the one affected by spatial S-R compatibility. The finding of no age-related differences in the effect of response discriminability may indicate no age differences in the second response decision processing stage.

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March 28, 1977
10:45 am

THE EFFECT OF DIFFERING FOREPERIODS ON PERFORMANCE OF THE FORWARD GRAB SWIMMING START. Carol Cooper, University of Northern Iowa.

The purpose of this study was to determine if there is an optimal length of foreperiod between the commands given by the starter and the sound of the gun to elicit a fast response when the grab start is used in competitive swimming. Measured responses were the time of initial hand movement (hand movement time) and time of the swimmer's feet leaving the block (starting time). A specially designed electronic timing device was used to control the length of the foreperiod interval, to activate the gun, and to measure hand movement time and starting time. Blocks of four trials at each controlled foreperiod interval of .5, 1, and 1.5 seconds and at one interval during which the length of the foreperiod was varied for each trial in the block (varied foreperiod) were presented in random order to 24 skilled competitive swimmers, 12 males and 12 females. Ages ranged from 12 to 17 years. Data were analyzed by a 2 x 4 ANOVA with repeated measures on the last factor. Sex was the first independent variable, and length of the foreperiod was the independent variable having repeated measures. For hand movement time, a calculated F (1, 46) = 3.2549 (p .05) indicated that there were significant differences due to treatment effects. When the Newman-Keuls procedure was applied, the 1.5 second interval was shown to elicit slower times than any other interval, and the varied foreperiod interval produced slower times than the .5 second interval. Neither the effect of sex nor interaction was significant. For starting time, no significant effects were found due to sex, to treatments, or to interaction between the two variables. When linear correlation was applied to hand movement time and starting time, no relationship was found between those two variables. It was concluded that among the foreperiod intervals of .5, 1, and 1.5 seconds and varied foreperiod there was no optimal foreperiod interval which elicited a faster response in the grab start racing dive than any other interval.

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March 28, 1977
11:00 am

THE EFFECT OF SEX, STIMULUS AND SUBJECT MOVEMENT ON REACTION TIME AND MOVEMENT TIME. Paul Dunham, Jr., University of Wyoming.

The purpose of the study was to investigate the effect of subject and stimulus movement on reaction time and movement time of males and females. Fifty students, 25 men and 25 women, enrolled at the University of Wyoming during the summer of 1976 agreed to serve as subjects for this experiment. The apparatus employed in the experiment included a stimulus mechanism consisting of a roller skate car and track; a response mechanism composed of a movable console, reaction time switch and target; and the appropriate controls. Subjects were randomly assigned to an order of practice and then given five trials on each of four conditions: stimulus moving, subject moving; stimulus moving, subject stationary; stimulus stationary, subject moving; and stimulus stationary, subject stationary. Analysis of various three-way classifications with repeated measures over the last two factors was used to determine the effect of sex and subject and stimulus movement. The results indicated that males reacted and moved significantly faster than females. Reaction time performance under motion was less proficient than when subjects were stationary. The interaction of subject action x stimulus action indicated that subject movement and stimulus stationary resulted in significantly longer reaction times.

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March 28, 1977
11:15 am

STARTLE RESPONSE AND MUSCULAR FATIGUE EFFECTS UPON FRACTIONATED HAND GRIP REACTION TIME. Geraldine Klimovitch, University of California, Berkeley.

A study of reaction time changes was undertaken as a viable means of exploring stress effects of an induced startle response and local muscular fatigue upon sensorimotor performance. The fractionation of a simple total reaction time (TRT) into central and peripheral temporal components (premotor-PMT, and motor time-MT, respectively) helped to define the locus of reaction time change following an induced startle response as well as following prescribed fatiguing exercise regiments. Simple right hand grip reactions were observed in sixteen college students (eight males and eight females). Comparative data were obtained from subjects before and after startle response induction via an auditory stimulus (110dg, 2000Hz, 500msec. duration). In addition, the effects upon sensorimotor performance were studied relative to two intensities of fatiguing serial isometric exercise (5-second maximal contraction, 5-second relaxation) which incurred a moderate strength decrement of 41.8% or an intense strength decrement of 55.1%. Substantial changes in different temporal dimensions of reaction time performance were observed following an induced startle response as well as following exercise induced fatigue. Mean values for total reaction time significantly lengthened from baseline scores (164.2 vs. 180.3 msec.) following the startle stimulus. The increase in TRT was due primarily to the PMT component (90.3 vs. 101.4 msec.). In contrast, lengthened TRT following both fatigue regimens were due to substantial increases in MT component. A strength decrement of 41.8% resulted in a 19 msec. increase (75.4 vs. 93.8 msec.) in MT values, while the MT component lengthened 33 msec. (71.5 vs. 104.5 msec.) following the intense fatigue schedule. These results suggest that although the performance of tasks which demand a high degree of precision, accuracy and fine motor control may be disrupted by the introduction of such stressors as an induced startle and local muscular fatigue, the neuromuscular mechanisms mediating performance disruption are dissimilar.

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March 28, 1977
11:30 am

THE INFLUENCE OF THE ALPHA BRAINWAVE RHYTHM DURING MENTAL PRACTICE WHILE ACQUIRING A SPECIFIC TAP DANCE SKILL. Gloria Williamson, North Texas State University.

This research was designed to investigate the effectiveness of mental practice while generating alpha brainwaves in learning a gross motor skill. Subjects were selected from University tap dance classes and had been taught basic tap dance technique. Undergraduate women (N=36) were stratified into three groups of 12 Ss, each representing three types of learning situations: physical practice instruction, mental-physical practice instruction and alpha mental-physical practice instruction. To equate the three experimental groups, a rhythm-coordination screening test was constructed, tape recorded and administered to Ss who were rated on a pass-fail basis by a panel of three judges. Ss in the alpha mental practice group were taught to generate alpha brainwave rhythms (8-13 Hz) in a series of five training sessions. The ability of Ss to generate alpha brainwaves was verified by an EEG reading prior to selection for the study. Results of this investigation indicate that after attaining a criterion level of skill, mental practice while generating alpha brainwaves is a more successful way to acquire a specific tap dance skill than is mental practice only while reading prepared directions or employing physical practice only. The amount of time required to learn the triple time step is shorter when employing mental practice and generating alpha rhythms, than utilizing the combination of mental-physical practice or physical practice only. Conclusions were based on the computation of the Student's t-test and ANOVA. In both cases the ANOVA yeilded results which were significant at the .01 level. Although this study investigated a specific tap dance skill, its educational importance relates to any type of activity utilizing a gross motor skill. The investigator has successfully used alpha mental practice in teaching a variety of skills in activity classes.

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March 28, 1977
11:45 am

INFLUENCING DENTAL HEALTH BEHAVIORAL INTENTIONS, SOCIAL NORMATIVE BELIEFS, MORAL BELIEFS AND ATTITUDES TOWARD THE ACTS OF BRUSHING, DIET, AND FLOSSING OF 5th GRADERS. James D. Brown, Ph.D., University of Missouri and Ronald J. Cook, Ph.D., University of Wisconsin-Stevens Point.

Under a grant from the American Dental Association, 375 fifth graders took part in a research program designed to assess dental health knowledge, attitudes and practice following participation in the A.D.A.'s Oral Health Teaching and Learning Program for Level II (Grades 4-6). Subjects were divided into three groups: (1) 5 classrooms where the teachers received intensive workshop experience on the Level II guide and materials; (2) 5 classrooms where the teachers participated in a 2 hour Orientation over the Level II guide and materials, and (3) 5 classrooms served as the control group. Utilizing a Solomon 4 group design, subjects received a pre-test; post-test one week after completing the program and a follow-up test one year after completion of the program. The purpose of this study was to assess dental health attitude and belief change. The instrument was based upon modifications of Dulaney's and Fishbein's approach to attitude, behavioral intention and belief assessment. The theoretical constructs of the model are:

$$\text{Behavior} \approx BI = \Sigma Biei_{W1} + \Sigma SNMc_{W2} + Aact_{W3} + MN_{W4} + SRB_{W5}.$$

Surprisingly, no significant differences occurred between the extensively trained and orientation groups. Differences did occur at the .01 level between the treatment and control groups and for pre and post-test scores for the treatment groups. Those aspects of the instrument dealing with flossing attitudes had the greatest influence on overall dental health attitude scores. On the follow-up test occurring one year later, no overall significant differences occurred between the experimental and control groups, however, a significant difference did occur in the behavioral intention factor in the instrument. Further analysis revealed the influence of the belief, and social normative scores on the final results.

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March 28, 1977
1:30 pm

THE INFLUENCE OF SUBLIMINAL PERCEPTION ON SMOKING BEHAVIOR.

Elbert D. Glover, The University of Kansas.

Subliminal perception is perception without awareness. It is further defined in terms of the subject's ability to respond to stimuli below the threshold of awareness. The stimuli, whether they be words or letters have been successfully retrieved without having consciously identified their meaning. Retrieved in the sense that the subjects responded in the individual experiments at significant levels set by the investigator. The general purpose of the study was to determine whether subliminal perception could be used as a means for altering cigarette smoking behavior. The study contained a total population sample of 72 subjects from Denton County, Texas. Each subject was screened by age group and sex. The group consisted of females of adult legal age i.e. at least eighteen years of age. An unobtrusive questionnaire which defined the characteristics of the group was administered. Included was a control group so that the effects of the subliminal experience could be studied. The subjects were screened, selected, and randomly assigned to two groups each consisting of 36 subjects. The experimental situation consisted of two different films, shown at two different sessions, with subliminal stimulation for the treatment group. The control group viewed the two films without the subliminal stimulation. The entire association between smoking and quitting smoking was presented subliminally. After an analysis of the data collected, a comparison of the differences between the control and experimental groups revealed that there was no significant difference in regard to base cigarette count between groups after the treatment had been administered. Thus smoking behavior was not altered through subliminal perception as carried out in this study. There was evidence that smoking behavior was altered but it was an unpredicted change, some subjects decreased their smoking patterns while others increased their smoking behavior. At present there is continuing research in this area for if subliminal perception can decrease smoking behavior it can possibly be used for other abusive behaviors associated with drugs, alcohol, and overeating.

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March 28, 1977
1:45 pm

FACTORS CONTRIBUTING TO THE DISCREPANCY BETWEEN CURRENT AND DESIRED PRACTICE OF HEALTH EDUCATION IN SELECTED SECONDARY PUBLIC SCHOOLS OF ILLINOIS

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The study was designed to determine the nature of differences and factors responsible for the differences between current status (practice) and desired status (theory) of health instruction in Illinois public secondary schools as perceived by a sample of three distinct groups: (1) Teacher training personnel; (2) High school administrators; (3) High school health instructors. Two questionnaires were developed for the study. One questionnaire consisted of items relative to the desired status of health instruction for public secondary schools in Illinois, and was administered to selected teacher training personnel and high school administrators. The second questionnaire consisted of two parts: current practice and desired status, which was administered to high school health instructors. Recommendations to reduce the discrepancy between desired status and current practice were formulated by personal interviews with one high school administrator and one health instructor from schools revealing the most overall opposing perceptions concerning the desired status of health instructors. Each of the eight categories was analyzed according to factors: (1) type of employment (teacher training personnel, high school administrators and high school health instructors; (2) school student enrollment size, (small, medium and large); (3) education level (major, minor, non-major or minor in health education); and (4) sex. The main factor which influenced the discrepancies between current practice and desired status of health instruction in Illinois public secondary schools was employment level. The main factors; sex, education, and school enrollment size usually did not influence the discrepancy between current and desired practice; however, a variation did occur among high school personnel in the three levels of school enrollment size concerning problems affecting the health instruction program. High school personnel selected for personal interviews confirmed much of the results gained through the questionnaire. Also, the personal interviews provided an excellent opportunity to gain recommendations to reduce the discrepancy between current practice and desired status. The analysis of variance was used for each of the eight categories. Five of the eight categories required a three factor design with repeated measures on the third factor and having unequal cell frequencies -- least square solution.

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March 28, 1977
2:00 pm

HEALTH KNOWLEDGE AND HEALTH INSTRUCTION IN COLORADO, Bruce G. Morton, Temple University, Patricia M. Legos, Temple University

The purpose of the study was to evaluate health instruction in a random sample of Colorado high schools by analyzing the relationship of senior high students' health knowledge to school district size and health instruction. Procedure. A stratified random sample of Colorado public secondary high schools, which included eighteen districts out of 181 total, was selected. The Seffrin Health Cognition Test was administered to a sample of 786 students drawn from each of the high schools. Administrators of sample schools were requested to respond to a questionnaire concerning the health education offered in their schools. Health knowledge mean scores and standard deviations were computed for the total sample and for students by district size and health instruction. Mean scores were compared with the norms by t test procedures. An analysis of variance was employed to test the significance of the mean score differences between students classified by the variables district size and health instruction. Findings. (1) Six of twenty schools offered health instruction in the form of a basic health course. (2) Mean health knowledge scores for the total sample and students from small, medium, and large school districts and from direct health instruction were significantly higher than the norms ($p<.01$). (3) Health knowledge scores were significantly higher ($p<.05$) in large district schools with non-direct health instruction than medium and small district schools with non-direct health instruction. However, health knowledge scores were higher in small district schools with direct health instruction than large or medium district schools with direct health instruction. (4) Health knowledge mean scores were significantly higher ($p<.05$) for non-direct health instruction in large and medium district schools but not significantly different in small district schools. Conclusions. (1) The importance of health instruction in the curriculum, especially non-direct, was confirmed. (2) Health instruction type and district size were important variables in student health knowledge scores.

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March 28, 1977
2:15 pm

INSTRUCTION ABOUT VENEREAL DISEASE AND ITS RELATIVE EFFECTIVENESS USING THREE TEACHING METHODS UTILIZING THE MOTION PICTURE.
Peggy Thomas, Southwest Missouri State University.

The purpose of this study was to determine if the achievement level of students' knowledge concerning facts about venereal disease increased following three methods of instruction utilizing the motion picture. Three major criterion groups were used which included a control group, and two experimental groups. All subjects took a pre and post standardized test on venereal disease. (A Venereal Disease Knowledge Inventory). The subjects in all three groups viewed two films on venereal disease which dealt with the physiological aspects of the disease. The control group viewed only the films, while Group II of the experimental group viewed the films plus a lecture on venereal disease. Group III of the experimental group viewed the films, had a lecture, and textbook assignment relating to venereal disease.

An analysis of covariance was used to analyze the data. The F ratio was not significant. No evidence was found to indicate that any one of the methods was superior over another. However, in looking at the means of the pre test and post test scores, it would seem to indicate that learning did take place in all three groups regardless of the teaching method selected.

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March 28, 1977
2:30 pm

DEVELOPMENT OF AN INSTRUMENT TO MEASURE ATTITUDES TOWARD DEATH AND DYING. Parris R. Watts, Emporia Kansas State College; Rosanne W. Andrews, University of Maryland.

The purpose of the investigation was to develop an instrument to measure death-related attitude change. A 30-item questionnaire employing the Likert method of summated ratings was constructed. Both positively and negatively weighted statements were utilized. The initial administration of the instrument known as the Watts-Andrews Death Attitude Questionnaire and hereafter referred to as the DAQ, involved 278 university and 293 high school students. The Hardt Death Attitude Scale (hereafter referred to as the DAS), was administered to all subjects concurrently with the DAQ to serve as a basis for comparison in validation analyses. Five weeks following the university group initial administration and four weeks after the high school group initial administration, the second administrations of the DAQ and DAS were conducted. The university group data analyses demonstrated Kuder-Richardson reliability coefficients of .887 and .906 on the initial and second administrations respectively. Test-retest reliability was found to be .912. The high school group data analyses demonstrated Kuder-Richardson reliability coefficients of .814 and .828 on the initial and second administrations respectively. Test-retest reliability was found to be .831. Pearson product-moment correlation analyses of the DAQ and the DAS initial and respective second administrations data, demonstrated significant, positive correlations within both the university and the high school groups at the .05 alpha level. It can be concluded from the results of the study that the Watts-Andrews Death Attitude Questionnaire serves as a reliable and valid evaluation instrument for use in college/university level death and dying education research. Furthermore it can be concluded that the questionnaire has death and dying education research application potential on the high school level. Death education instructional objectives cannot be assumed to have been achieved without the benefit of careful outcome measurement and evaluation to justify such an assumption. Therefore it is most strongly recommended that a wide range of death and dying education-related studies be conducted in order to determine how attitudes are being affected by instructional techniques presently employed. It is hoped that the development of the evaluation instrument to which this study was devoted, will prove useful in such research endeavors.

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March 28, 1977
2:45 pm

THE EFFECTS OF SPECIFICALLY STATED BEHAVIORAL OBJECTIVES ON COGNITIVE LEARNING IN MEASURED I.Q. GROUPINGS. Harold E. Wingard, Old Dominion University.

Purpose: The purpose of this study was to assess the effects of presenting specifically stated behavioral objectives upon cognitive learning among I.Q. groupings in health education.
Specific behavioral objectives were prepared for nine lessons on sex education for ninth grade students. A sex education achievement test was developed to examine the knowledge, comprehension and application taxonomy categories within the cognitive domain.
An experimental group of 60 boys and 60 girls was divided into three equal subgroups of "low," "medium," and "high" measured I.Q. groupings. The experimental group was equated with the control group of 60 boys and 60 girls in the three subgroups according to scores obtained on the pre-test for achievement.
Pre-testing and post-testing were conducted to obtain data for analysis to answer two research questions: (1) Does I.Q. have a bearing on the student's cognitive learning when specific behavioral objectives are provided prior to instructions? and (2) Is there a difference in the student's cognitive learning if learning is classified as knowledge, comprehension, and application when specific behavioral objectives are provided to students prior to instruction.
A three-factor ANOVA procedure was used to answer the research questions formulated. The instructional "treatments" effect consisted of (1) Providing each member of the experimental group with a copy of the behavioral objectives prior to the instruction of each of nine lessons presented, and (2) Encouraged but did not permit more than four minutes of discussion about the behavioral objectives in each class period. The control group received the same instructional lessons as the experimental group with the exception of the two treatments explained above.
Results: Significant interaction existed between treatment group identification and measured intelligence. Significant difference was discovered among groups of students according to treatment group identification and cognitive knowledge classification.
Conclusions: Within the limits imposed by this investigation, it appears that the use of specific behavioral objectives seems not only to be effective in facilitating students with high learning capabilities, but their use seems most effective with those students in the "low" measured intelligence quotient range. Among the three taxonomies, knowledge was influenced greatest when intelligence subgroupings were investigated.

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March 28, 1977
3:00 pm

PHYSICAL FITNESS LEVELS IN FEMALE CADETS AT THE UNITED STATES AIR FORCE ACADEMY. Richard W. Cote' III, U. S. Air Force Academy; James C. Thomas, U. S. Air Force Academy.

With the advent of coeducation at the service academies, a need for more upto date and current information on women's abilities to handle physical stress is required. The purpose of this study was to provide this information by evaluating the level of fitness of the first female class at the United States Air Force Academy and compare them to their civilian and military counterparts. A sample of seventeen women cadets of the Air Force Academy's Class of 1980 was assessed to determine the maximal oxygen consumption. Another sample of thirty-six women from the entering class was used to determine the percent fat figure for the class. The samples were selected using the Ponderal Index to insure a stratified sample of body types. The maximal oxygen consumption test was completed on the treadmill using the Short Balke protocol. Metabolism was determined using open circuit spirometry and utilizing a Raytheon computer system for recording and calculating data. Percent body fat was determined by first calculating the body densities for each subject using the method of Katch and McArdle. The subsequent densities were used in the equations of Siri and Keys-Brozek to obtain percent body fat. The average maximal oxygen consumption for the women cadets was 46.1 ml/Kg.min (SD=40). Correcting for the 2300m altitude here at the Academy, the corrected "sea level" value compared quite favorably with other reported values for college age females. The mean percent of body fat of 24.3 places these subjects well within normal ranges for college females. It can be concluded that the female cadets are a highly fit population exceeding the reported values for their civilian counterparts.

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March 28, 1977
3:45 pm

MUSCULAR EFFICIENCY DURING STEADY-RATE EXERCISE II: EFFECTS OF WALKING SPEED AND WORK RATE. Casey M. Donovan and George A. Brooks, Exercise Physiology Laboratory, Department of Physical Education and Laboratory of Chemical Biodynamics, University of California at Berkeley.

A comparison of walking against vertical (gradient) and horizontal (trailing weight) forces was made during steady-rate exercise at "0", 250, 500, and 750 kgm/min with speeds of 3.0, 4.5 and 6.0 km/hr. In all cases exponential relationships between caloric cost and increasing work rate and speed were observed. These exponential relationships indicated that muscular efficiency during walking is inversely related to speed and work rate. "Work" (level, unloaded walking as the baseline correction), "delta" (measured work rate as the baseline correction) and "instantaneous" (derived from the equation describing the caloric cost of work) efficiencies were computed. All definitions, work (range of 21.0% to 43.9%), delta (19.6% to 43.9%) and instantaneous (18.3% to 44.1%), yielded decreasing efficiencies with increasing work rates. At work rates above 250 kgm/min the curves describing the relationship between caloric cost and work rate were parallel for vertical and horizontal forces, indicating equivalent efficiencies in this range. Only the delta and instantaneous definitions accurately described these relationships for vertical and horizontal work. Of these two, the delta efficiency estimation was judged to be superior as it is based directly on the raw data. The work efficiency definition was found inadequate when the relationship between caloric cost and work rate is non-linear. Determinations of combined work loads (gradient plus trailing weights) were made and the energy costs of both types of work found to be additive.

This research supported in part by a University of California Faculty Research Grant, in part by Biomedical Research Development Grant RR-7006-10, and in part by a grant from the United States Energy Research and Development Administration.

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March 28, 1977
4:00 pm

A COMPARISON OF PERCENT OF MAXIMAL OXYGEN UPTAKE ATTAINED BY GRADUALLY INCREASING HEART RATES ON THE BICYCLE ERGOMETER AND MOTORIZED TREADMILL. Marilyn Frankel, California State University, Sacramento; Irvin E. Faria, California State University, Sacramento.

The principle of the direct relationship between heart rate and oxygen uptake with increases in work has been widely accepted. The results of this study indicate that perhaps the heart rate is not an equally strong indicator of oxygen uptake as previously reported and that the percent of maximum oxygen uptake at specified heart rates may vary from activity to activity. The purpose of this study was to determine the percent of maximal oxygen consumption (% of $\dot{V}O_2$ max) at given heart rates (HR) on the bicycle ergometer and on the motorized treadmill. Ten female subjects (Ss), age 18-24 years, performed a $\dot{V}O_2$ max test on the bicycle and treadmill. Percent of $\dot{V}O_2$ max at HR's of 120, 130, 140, 150, 160, 170 and 180 beats per minute were compared for the bicycle and treadmill. A significant difference ($p < 0.05$) for mean $\dot{V}O_2$ max between the treadmill test (48.82 ml/kg/min) and the bicycle test (44.71 ml/kg/min) was found. There were no statistically significant differences between % $\dot{V}O_2$ max of the two tests at any of the given heart rates. Regression analysis indicated a linear relationship between % $\dot{V}O_2$ max and HR for the two tests. However, an intersecting of the two lines was observed at approximately the 70% $\dot{V}O_2$ max level. It was concluded that the % $\dot{V}O_2$ max values reveal a different pattern of oxygen uptake for the treadmill and bicycle ergometer.

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March 28, 1977
4:15 pm

METHODS EMPLOYED TO DETERMINE THE NET ENERGY COST OF ERGOMETRIC ROWING. G.R. Hagerman, Human Performance Laboratory, Syracuse University; E.L. Fox, Laboratory of Work Physiology, The Ohio State University; F.C. Hagerman, Department of Zoology, Ohio University.

Fifteen national caliber lightweight oarsmen were subjects in a descriptive study. One important aspect of the study was determination of net energy cost for a 6-minute maximal exercise on a Lyons-type rowing ergometer. This exercise simulated a 2000m race in an 8-oared shell. V_E (BTPS) and V_{O2} were measured at rest, during each minute of exercise, and during the initial 15 minutes of recovery phase. The open circuit spirometry method was employed. Three methods were compared in evaluating energy cost of this exercise. The three were: (1) old method (traditional); (2) new method (theoretical); and (3) old method-modified (traditional). The old method consisted of calculating net energy cost aerobically from exercise (net V_{O2} for 6 minutes in l/O_2) and anaerobically from recovery oxygen (net O_2 debt in l/O_2). The new method utilized the same calculation for the aerobic net energy cost of the exercise as the old method. The anaerobic energy component for the new method was subdivided into alactacid and lactacid mechanisms. The old method-modified included the same calculation for aerobic net energy cost as the old and new methods. The old method-modified calculated the lactacid anaerobic energy component identical to the new method; but the alactacid component's calculation was altered from that of the new method. The means for total kcal, kcal/min, and kcal/kg.min were also computed for the three methods. An analysis of variance using repeated measures was incorporated to analyze the net energy cost (cal/kg.min) of the three methods. The Tukey multiple comparison test was used to compare the means of the three methods. The results indicated the three methods cannot be used interchangeably for calculating the net energy cost of this exercise. The new and the old method-modified techniques as computed were more similar in the final results of the multiple comparison test.

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March 28, 1977
4:30 pm

EFFECTS OF PEDALLING RATE CHANGES ON MAXIMAL OXYGEN UPTAKE AND PERCEIVED EFFORT DURING BICYCLE ERGOMETER WORK. Robert J. Moffatt and Bryant A. Stamford, University of Louisville.

The present investigation was purposed to determine the efficacy of progressively increased pedalling rate (P) as opposed to progressively increased resistance (R) during assessment of maximal oxygen uptake ($\dot{V}O_2max$)on the mechanically braked (Monark) bicycle ergometer. Twenty male University students completed two randomly assigned experimental sessions consisting of two maximal stress tests each (i.e. either two P or two R tests). In addition, nine female University students completed two randomly assigned experimental sessions consisting of one maximal stress test each (i.e. either one P or one R test). Tests were discontinuous in nature requiring alternating three minute work bouts and ten minute rest periods. The following variables were monitored: $\dot{V}O_2$, ventilation ($\dot{V}_E$), heart rate (HR, lactic acid (HLa), pedal revolutions, perceived exertion via magnitude estimation, and test preference (choice) data. It was found that VO_2max, HRmax and HLa were quite similar regardless of test protocol. Magnitude estimates were significantly ($P < .05$) lower for male subjects during P testing, and preference data revealed that 80% of male subjects preferred P testing. Conversely, magnitude estimates were significantly ($P < .05$) lower for female subjects for R testing and only 55% of female subjects preferred P testing. Repeat testing demonstrated that P testing could be reliably repeated immediately within the same experimental session whereas R testing resulted in a significant ($P < .05$) reduction in $\dot{V}O_2max$. It was concluded that progressively increased pedalling rate offers a physiologically acceptable means to assess $\dot{V}O_2max$ on the mechanically braked bicycle ergometer for males and females. It was further concluded that progressively increased pedalling rate offers a psychologically (perceptually) preferable means to assessment of $\dot{V}O_2max$ for males, however, not for females.

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March 28, 1977
4:45 pm

PHYSIOLOGICAL COMPARISON OF TWO WORLD CLASS DISTANCE RUNNERS

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The purpose of this investigation was to report the contrasting physiological characteristics of two world class distance runners. Frank Shorter, Olympic marathon champion and Steve Prefontaine (now deceased) holder of 10 American distance records were tested on numerous physiological parameters. The data for Shorter and Prefontaine ( ) were as follows: age, yrs - 27 (24); ht, cm - 178 (174); wt, kg - 61.2 (68); fat, % - 2.2 (4.8); $\dot{V}O_2$ max, ml/kg•min - 71.3 (84.4); heart rate max, beats/min - 195 (210); heart volume, ml - 732 (1399); treadmill performance time, min:sec - 7:15 (8:30); lactic acid max, mg% - 95 (122); $\dot{V}O_2$ during a steady state test at 12 mph, ml/kg•min - 59 (73); slow twitch muscle fibers, % - 80 (77); and succinate dehydrogenase, μ moles/g x min^{-1} - 16.7 (22.2). Prefontaine had a significantly better 1 mile run time than Shorter (3:54.6 vs 4:02.5). Prefontaine's greater muscle mass and glycolytic enzyme system, and higher $\dot{V}O_2$ max values may have been an advantage in the shorter middle-distance events. While 3 and 6 mile performance times are fairly comparable for both Shorter and Prefontaine (12:52 vs 12:51.08 and 27:09 vs 26:51.8), physiological and histochemical values show marked differences. Of particular interest is the difference in the $\dot{V}O_2$ max of these two runners. Shorter's value appears to be low for a distance runner of his caliber, but is higher than the value reported for Derek Clayton, holder of the world's best marathon. Shorter's increased efficiency during submaximal treadmill running would give him the advantage over Prefontaine during long distance races, such as the marathon. It is apparent from this data that $\dot{V}O_2$ max in itself does not guarantee a fast performance in distance running. The data show the complexity and difficulty of determining distance running performance capability.

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March 28, 1977
5:00 pm

PHYSICAL FITNESS CHARACTERISTICS OF PROFESSIONAL FIREFIGHTERS.

D.L. Santa Maria, C.O. Cotson, P.O. Davis, R.A. Schwartz,
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A representative sample of 100 professional firefighters from the Washington, D.C. Metropolitan area were administered tests to determine the following characteristics: body composition, muscular strength, muscular endurance, muscular power, flexibility, and aerobic capacity. The following measures were derived: standing height, body weight, lean weight, fat weight, percent body fat, resting systolic and diastolic blood pressures, resting pulse pressure, resting and maximum heart rates, maximum oxygen consumption, maximum oxygen pulse, maximum ventilatory equivalent, right and left grip strength, sit-ups, push-ups, standing broad jump, hamstring flexibility, and 12-min. run. Tests were administered in the laboratories of the University of Maryland Sports Medicine & Physical Fitness Center. A one-quarter mile running track was used for the 12 min. run test. Maximum oxygen consumption data were derived using a motor driven treadmill. Standardized procedures were used in the collection and analysis of expired gases. The criterion for maximal work was an R.Q. greater than 1.0 and no increase in heart rate following an increase in workload and/or subject's inability to continue the test. EKG monitoring was used in determining heart rates. Lean body weight was estimated from anthropometric and skinfold data using the formula of Zuting and Golding. Subjects ranged in age from 21 to 57 years ($\bar{X}$=33 years). Mean height and weight were 176.7 centimeters and 83.4 kilograms respectively. Other results showed the following mean values: percent body fat - 21.1, sit-ups - 36.8, pull-ups - 5.5, push-ups - 18.9, standing broad jump - 75.9 inches, blood pressure - 129/81, resting heart rate - 66.7, max. heart rate - 183.9, max. VO_2 - 3.28 L/min., max. VO_2 - 39.59 ml/kg/min., 12-min. run - 1.2 miles. In terms of physical fitness parameters, the results of this study indicate that a large majority of the firemen are overweight in terms of percent body fat (using 16% fat as a recommended maximum). A very large majority of these subjects lack relative muscular endurance as evidenced by their low pull-ups scores. And, less than one-half of these subjects showed adequate aerobic capacities as indicated by their VO_2 (recommended minimum - 40 ml/kg/min) and 12-min. run (recommended minimum - 1.5 miles) scores.

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March 28, 1977
5:15 pm

THE EFFECTS OF SELECTED INTERVAL EXERCISE ROUTINES ON BRONCHOSPASM IN ASTHMATICS. Annette F. Racaniello, Springfield College.

Nine asymptomatic asthmatics (ages7-24) were tested for bronchospasm elicited during four different interval exercise routines. The routines tested were 2 minutes run-2minutes rest(2-2); 2 minutes run-4 minutes rest(2-4); 5 minutes run-5 minutes rest(5-5); and 5 minutes run-10 minutes rest(5-10), with each routine requiring 20 minutes of running. Subjects ran on the treadmill at a speed and grade found previously to elicit a heart rate of 160 BPM. Pulmonary function measures of forced expiratory volume in one second ($FEV_{1.0}$), forced vital capacity (FVC), and $FEV_{1.0}$/FVC percentage were taken at rest; one minute after each run (post-exercise); 30 seconds prior to the next run (pre-exercise); and 15 minutes into the recovery period. Both of the routines with 2 minute runs (2-2 and 2-4) showed increases in FVC and $FEV_{1.0}$ following the first run. The two longer duration routines (5-5 and 5-10) showed a depression of airway conductance following the first run. The 5-5 routine continued to show this depression throughout successive runs, while the 5-10 routine showed a slight rise as the repeated runs were continued. All of the exercise routines caused exercise-induced bronchospasm (EIB) according to clinical standards of a 10 percent reduction in $FEV_{1.0}$. Statistical analysis revealed that the 5-5 exercise routine showed the greatest amount of EIB. None of the ANOVA revealed significant differences among the other three routines, which indicated that the 2-2, 2-4, and 5-10 run-rest routines showed similar amounts of EIB. It was concluded that 1.)interval exercise produces EIB regardless of the pattern used; 2.) the amount of EIB produced becomes stabilized within a few repetitions of the run-rest routine; 3.) EIB is reduced during the running period with increases during the rest period; 4.) the 5-5 exercise pattern was the least desirable routine.

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March 28, 1977
5:30 pm

MOTION CONTINUUM: AN AESTHETIC OF SPORT AND DANCE.
Jamie L. Aiken, University of Oregon.

The purpose of the research was to study through the medium of film the aesthetic similarities of motion existant between modern dance and three selected track and field events: the shot put, the high hurdles, and the triple jump. The investigator assumed that all locomotor activity is related in terms of the dynamics of time, space, and force. It was the investigator's premise that sport motion is not generally perceived in the same aesthetic construct as is dance motion, but that either can be observed from an aesthetic point of view. The filmed study is an artistic identification of this concept. Four pilot projects were completed prior to the filming of the major study to determine methodology for creating an artistic cinematic composition of comparative motion. The methods determined by the researcher were: 1) that the track footage be filmed in a documentary manner during practice and competition with the camera positioned at various angles, speeds, and lenses; and 2) that the dance footage be filmed with preplanned "takes" of choreographed works, improvisation, and rehearsal. The resultant film was a five and one-half minute 16mm black and white final answer print which was edited from thirty-four and one-half minutes of raw footage. Conclusions, based upon evaluations by five sources (the researcher's thesis committee, a university film editing class, a tabulation of written responses from three audience groups, academic colleagues, and a retrospective analysis by the thesis writer), indicated that an aesthetic relationship of the two areas of motion can be effectively articulated through the medium of 16mm film.

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March 29, 1977
9:00 am

SEX GAP IN SWIMMING PERFORMANCE NARROWS. Charles W. Jackson, Old Dominion University, Norfolk, Virginia; Christina W. Jackson, College of William and Mary, Williamsburg, Virginia.

PURPOSE: The purpose of this study was to critically analyze swimming performance times of female and male competitors at the national level over a five year period.

PROCEDURES: Data from the 1971-75 National AAU Indoor Swimming Championships were collected and analyzed according to sex, year and event by two factorial design ANOVA techniques. The 100 yard freestyle event was selected as an indication of speed and anaerobic performance. The 1650 yard freestyle event was chosen as an indication of prolonged endurance and aerobic performance. The top 16 competitors in each selected event X sex X year comprised the 160 subjects of this investigation. These swimmers were the actual finalists and consolation finalists in the competition and thus one can assume somewhat equal motivation, equipment advantage, and training and coaching techniques between the sexes.

RESULTS: The two factorial design ANOVA for the 100 yard freestyle data revealed that there were significant sex and year differences in the data. A further multiple classification analysis of the data indicated the 94% of the variation was due to the sex factor with the males being better performers, and 2.5% of the variation was due to the year factor. The two factorial design ANOVA of the 1650 yard freestyle revealed similar results.

It is noteworthy that the gap in differences of mean performance for these events is narrowing. The percentage of difference for the 100 yard freestyle in 1971 was 14.4% and in 1975 it was down to 12.6%. In the 1650 yard freestyle distance event the women were closer to the men's performance and they are getting closer; percentage of differences 8.6% in 1971 and 7.4% in 1975.

CONCLUSIONS: In comparison with national caliber male swimmers, national female swimmers demonstrate slower times for events requiring aerobic and anaerobic performance. The percentage of differences determined in this study are similar to those reported by Plowman in a study of swimming world records. They are also in agreement with those of Dyer, a geneticist at Adelaide University in Australia, who conducted a similar study of performance in the 100 meter freestyle for years 1934, '54, and '74. Thus when given the opportunity, female swimmers seem to be narrowing the performance gap with their male counterparts.

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March 29, 1977
9:15 am

POTENTIAL PHYSICAL EDUCATORS PERCEPTION OF THE ROLE OF PHYSICAL EDUCATION. Marc Mauseth, Purdue University.

This study was conducted in order to better understand the perception of the role of physical education held by those students in teacher preparation programs in physical education. Based upon a review of the literature and informed speculation, a questionnaire was formulated which gathered data from seven independent variable groups and about students' perceptions of fourteen different roles for physical education. The questionnaire was completed by 349 students at the University of New Mexico, Ohio State University, State University of New York at Brockport, and the University of Oregon, enrolled in required professional courses in physical education during the Spring of 1976. The results of the analysis led to the findings that within each school it is possible to account for some of the variance in response of students' perception of the role of physical education by variables from the independent variable groups of: 1) demographic characteristics: sex, and class level; 2) the point in an individual's life when he/she makes the decision to become a physical educator; 3) the factor or factors which influence an individual to want to become a physical educator; 4) the amount of experience an individual has had in competitive athletics; 5) the individual's attitude toward the relationship of physical education and athletics; 6) the individual's general lifestyle as measured by his/her use of free, unobligated time; 7) the type of job position which an individual wants upon graduation. Interestingly, the variable group which accounted for the greatest amount of variance differed for students at each school. However, the variable group which consistently explained the highest amount of variance was "the individual's lifestyle," as measured by the use of free, unobligated time. Most of those responding indicated they wanted to spend a great deal of time on all of the role behaviors measured in the study except classroom management and administrative tasks. The role behaviors which received the greatest support by the majority of the respondents were teaching motor skills and developing physical fitness in students. A final tendency which was revealed by this study was for there to be some evidence of a linear relationship existing between questionnaire items related to coaching and athletics and homogeneity of responses.

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March 29, 1977
9:30 am

LEADERSHIP BEHAVIOR OF MALE AND FEMALE HEADS OF DEPARTMENTS OF PHYSICAL EDUCATION IN UNIVERSITIES AND COLLEGES

Keith Milner - University of Illinois

The purposes of this study were to determine:1.If a difference exists between(a)the actual leadership behavior of department heads and(b)the ideal leadership behavior of an ideal department head as described by the department heads and by their faculties. 2.If a difference exists between the actual and ideal leadership behavior of male and female department heads as described by themselves.3.If a difference exists between the actual leadership behavior of male and female department heads as described by their faculties.4.If a difference exists between the ideal leadership behavior of male and female department heads as described by their faculties.The data for this study were obtained through the use of the Leadership Data Booklet(LBDQ-Real,LBDQ-Ideal).The data from 49 departments were used.This included data from 49 department heads and 427 faculty for a return rate of 78.9 percent.The findings were:1.Department heads described their actual leadership behavior as exhibiting more consideration and initiation of structure than did the faculty members who described their department head's leadership behavior.2.Department heads described the two dimensions of leadership behavior,consideration and initiation of structure,of an ideal department head in the same way as did their faculty members.3.Male and female department heads described the consideration dimension of actual leadership behavior in the same way.Female department heads described themselves as exhibiting more initiation of structure than male department heads described themselves as exhibiting.4.Male department heads described the two dimensions of leadership behavior,consideration and initiation of structure,of an ideal department head in the same way as did female department heads.5.An ideal department head was described by male and female department heads as exhibiting more consideration and initiation of structure than the male and female department heads believed that they exhibited themselves.6.There were no differences(except in two situations) between the two dimensions of actual leadership behavior for either male or female department heads,as described by male or female faculty members,irrespective of whether the faculty were members of a segregated or an integrated department.7.There were no differences between the two dimensions of leadership behavior of an ideal department head as described by male or female faculty members,irrespective of whether the faculty were members of a segregated or an integrated department.

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March 29, 1977
9:45 am

RETENTION PROCEDURES FOR UNDERGRADUATE MALE PHYSICAL EDUCATION MAJORS. Louis R. Munch, Ithaca College.

The central purpose of this investigation was to determine those criteria and administrative practices which are currently favored in the retention of undergraduate male physical education majors. A secondary purpose was to develop guidelines which would assist institutions in establishing their policies and practices for the appraisal of male students in physical education. The main source of data for this investigation was the institutional personnel involved in the retention practices in twelve selected professional preparation programs. These undergraduate male physical education programs possessed a degree of excellence as judged by a qualified panel with specific standards in mind. The major results included the following: (1) Physical education officials currently favored (in both actual and recommended practice) a combination of both objective and subjective evaluations for the appraisal of their students in the professional preparation program. (2) Although the major factor actually utilized for selective retention in physical education was academic achievement in all course work, physical education officials deemed academic achievement in student teaching and staff evaluations of professional promise as the two most important factors in the evaluation, and (3) By and large, physical education officials do not utilize nor recommend any test or tests to measure physical ability, motor ability, physical fitness, athletic ability, and/or organic vigor as part of the selective retention requirements for male physical education majors. On the basis of an analysis of the data regarding selective retention for physical education and a review of the literature, the following major implications are made: (1) The philosophical orientation and purpose of an educational institution and/or professional preparation program in physical education should determine the nature of the selective retention requirements, (2) Staff evaluations of professional promise and academic achievement in student teaching are the two most essential factors, (3) The retention or rejection criteria should be applied at the end of the sophomore year and at the end of the junior year and/or before student teaching, and (4) A faculty committee should be delegated the responsibility for the appraisal program leading to retention or rejection of students in physical education.

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March 29, 1977
10:00 am

JOB SATISFACTION AS IT RELATES TO SIMILARITY IN PHILOSOPHIC VIEW BETWEEN PHYSICAL EDUCATION FACULTY MEMBERS AND THEIR DEPARTMENT CHAIRPERSON. Jean L. Perry, University of Illinois.

This study was conducted to determine the relationship between the level of job satisfaction and the similarity in philosophic view between physical education faculty members (N=198) and their department chairperson (N=30) in four-year colleges and universities in the Midwest. Also considered was the effect on job satisfaction of seven demographic variables: (1) sex, (2) age, (3) highest attained educational degree, (4) years a full-time appointment had been held in the current department, (5) tenure status, (6) present academic rank, and (7) years of administrative experience. The questionnaire used to collect data for this study yielded eight scores: (1) philosophy, (2) philosophic difference, (3) work, (4) salary, (5) promotion, (6) supervisor, (7) co-workers, and (8) total job satisfaction. Through multiple regression analysis it was determined that three of the seven demographic variables were significantly associated with the philosophic difference score of the faculty members: (1) highest attained educational degree, (2) present academic rank, and (3) years of administrative experience. These three variables along with the variables of sex, years a full-time appointment had been held in the current department, and tenure status had a significant effect on at least one of the six job satisfaction scores. It was hypothesized that the relationship between philosophic difference score and job satisfaction would become more apparent as differences in demographic variables were taken into account. However, no significant association between the philosophic difference score and the philosophic difference score squared and job satisfaction was found even after differences in demographic variables were accounted for by multiple regression analysis. The multiple regression analysis conducted for the department chairpersons revealed only one demographic variable, highest attained educational degree, which had a significant effect on job satisfaction. Although this demographic variable also had a significant effect on the philosophic difference score squared of the department chairpersons, the philosophic difference score of the department chairpersons was not found to have a significant effect on job satisfaction. No relationship was found between the level of job satisfaction and the similarity in philosophic view between physical education faculty members and their department chairperson in four-year colleges and universities in the Midwest.

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March 29, 1977
10:15 am

THE INFLUENCE OF COMPETITION ON ANXIETY LEVELS OF WOMEN'S INTERCOLLEGIATE BASKETBALL PLAYERS. Kathleen Connell, Springfield College.

The changes of anxiety levels over the course of a competitive season, and the changes in anxiety levels prior to and following competition were the two major problems for investigation in this study. In testing the first hypothesis and determining if a difference existed among the mean anxiety state scores obtained before and after each regularly scheduled game and the regional tournament, an analysis of variance for repeated measures was employed. The results of the analysis of variance indicated there were no significant differences between the mean anxiety scores in the pre-game situation. However, there was a significant difference between the mean anxiety scores for the post-game situation. The obtained F of 3.51 was higher than the necessary Table F of 2.58 for significance. In testing the second hypothesis and determining if a difference exists between the mean state anxiety scores obtained before and after the three regular season games described as highly anxious contests as compared to the mean state anxiety scores obtained before and after the three regular season games described as low anxious contests, an analysis of variance for repeated measures was employed. There were significant differences between the mean anxiety scores in the pre-game and the post-game situations. The obtained F for pre-game of 15.99 and the obtained F for post-game of 35.29 were both significant since a necessary F of 2.61 was necessary for significance. In testing the third hypothesis and determining if a difference exists between the mean trait anxiety scores obtained prior to the season as compared to the mean trait anxiety scores obtained at the conclusion of the season, repeated measures t-analysis was used. There was no significant difference between the pre-season and post-season trait anxiety scores. The pre-season mean (36.36) and standard deviation (6.31) varied little from the post-season mean (36.54), thus resulting in a non-significant t of .023. The following conclusions have been made: 1) There was a difference in the post-game anxiety levels. The intervening variable which caused the significance of the post-game state anxiety scores was the team's losses and 2) There was a significant difference between the three games described as high anxious as compared to those three games described as low anxious. The significance was a result of two factors: the caliber of competition and an emotional reaction to defeat.

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March 29, 1977
10:45 am

THE EFFECT OF VIEWING PROFESSIONAL SPORT ON THE ANXIETY LEVEL OF THE SPECTATOR. March L. Krotee, University of Minnesota; James A. Metcalf, George Mason University.

There is little doubt that spectatorism is emerging as an integral segment of the American Culture. It appears that many individuals prefer the vicarious experience of spectator participation to actual physical involvement. Some researchers suggest that the spectator experience does not significantly differ from actual physical participation. With this in mind, it seems appropriate that the physical educator gain insight into the nature of the spectator experience and its relationship with various physical as well as psychosocial parameters. The purpose of this study is to investigate the anxiety level of the spectator and determine if this anxiety level is affected by vicarious spectator experience. The data was randomly gathered at a professional box lacrosse match utilizing the Cornell Word Form - 2 Test. The Cornell Word Form - 2 Test was administered at the beginning and directly after the match to one hundred and forty-five spectators. A student's t-test was applied to the data which yielded results that were not significant at the .05 level of confidence. The findings indicate that the spectator experience may not offer as much purgation of anxiety as needed for catharsis effect and may not parallel the anxiety level of actual physical involvement in organized sport.

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March 29, 1977
11:00 am

THE EFFECTS OF VERTICAL AND HORIZONTAL MODELS OF TEACHING ON THE DEVELOPMENT OF SPECIFIC MOTOR SKILLS AND SELF-CONCEPT OF ELEMENTARY AGE CHILDREN. Thomas J. Martinek, University of North Carolina at Greensboro; Leonard D. Zaichkowsky, Boston University; John T.F. Cheffers , Boston University.

The purpose of this study was to determine the effects of vertical and horizontal models of teaching on the development of specific motor skills and self-concept in elementary age children. Two hundred and thirty Boston school children, grades one through five, participated in either a physical activity program where the teacher made all the decisions (vertical model), or in a program where they shared in the decision-making process (horizontal model). Additionally, 115 elementary school children were used as a control group. The Cheffers Adaptation of Flanders Interaction Analysis System (CAFIAS) was used to verify the treatments used in the study. Schilling's Body Coordination Test (BCT) was used to test motor skill development, and the Martinek-Zaichkowsky Self-Concept Scale for Children (MZSCS) was used to measure self-concept. A 2x3x5 ANCOVA was used to test for sex, treatment and grade. The results indicated that a teacher-directed approach appears to be best for the development of motor skills, and that a student-sharing approach has a definite effect on the development of self-concept. A linear improvement was found for the five grades in motor skill development. There was a significant decline in self-concept for grades 3,4, and 5. There were no significant correlations found between self-concept and motor skill scores for all three groups.

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March 29, 1977
11:15 am

A MODEL FOR EXAMINING SELF-ESTEEM CHANGE AMONG YOUTH SPORT PARTICIPANTS. Michael W. Passer, UCLA

The rapid growth of organized youth sports has stimulated debate regarding the psychological and social effects of competitive sport experiences on children. In particular, professional and lay critics of competition often note the enormous influence that sport-related success and failure experiences may have on childrens' self-esteem. Proponents contend that youth sports build confidence and self-esteem, while opponents note that psychological harm may result from failure in athletic activities that often place extreme emphasis on success. Unfortunately, there is little evidence on this issue, and most contentions are based on speculation or selectively chosen examples. The goal of this paper is to develop a model for understanding how participation in competitive sports can influence a child's self-esteem. Guided by Coopersmith's (1967) taxonomy of success-related situations, this model explores how several types of success and failure experiences encountered during sports participation may mediate self-esteem change. First, the relationship between self-esteem and success-failure in social interactions is examined. Self-esteem is shown to be associated with a number of variables that may influence one's popularity among peers. These variables include the person's social power, anxiety, and acceptance of others. In turn, social acceptance and rejection are postulated to be important antecedents of self-esteem change. Second, success and failure in task interactions (playing well or poorly, winning or losing) are linked to several factors, such as perceived competence, expectancy of future success, and affective reactions to achievement-related performance, that may influence self-esteem change. Third, the effects of acquiring positions of leadership and social power on self-esteem, and factors influencing the acquisition of such power, are examined. Finally, cognitive variables, such as causal attributions for success and failure, are discussed as mediators of self-esteem change. It is concluded, from both theoretical and empirical considerations, that the assumption that youth sports unidirectionally influence childrens' self-esteem is unsupported at this time. Further, it is suggested that future research focus primarily on determining factors that mediate differences in self-esteem change <u>within</u> samples of youth sport participants, rather than comparing differences <u>between</u> samples of participants versus nonparticipants.

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March 29, 1977
11:30 am

EFFECTS OF GROUPING ON BASKETBALL SKILL AND ATTITUDES TOWARD PHYSICAL EDUCATION. John K. Scheer, Gerald E. Landwer, Roger A. Koehler, University of Nebraska-Lincoln.

The purposes of this study were to determine the effects of homogeneous and heterogeneous grouping of junior high boys on (1) basketball skill acquisition and (2) attitudes toward physical education. Three items from the AAHPER Basketball Skill Test and the Wear Attitude Inventory were administered to 112 seventh grade boys enrolled in two physical education classes. Pretest results from the under basket shot, speed pass, and dribble tests provided the investigators with a skill rank ordering within each class based on the total T score for each subject. Subjects were matched by skill within each class, and one of each pair was randomly assigned to a group from which four heterogeneous squads were derived, the other to a group from which four homogeneous squads were derived. In each class, the eight squads of seven subjects each received the same instruction in a seven-week basketball unit. The subjects were then post-tested on the same skill tests and the alternate form of the Wear Attitude Inventory. A randomized blocks analysis of covariance was performed with post-basketball skill and post-attitude comprising the dependent measures. The covariate was pre-attitude. Subjects were blocked on pre-basketball skill and randomly assigned to treatment groups. A significant interaction on post-attitudes resulted, indicating that attitude differences between the homogeneously and heterogeneously grouped subjects were not consistent across pre-skill blocks. Subsequent simple effects analyses indicated that only the highest skilled subjects showed differences in attitude in favor of the homogeneous group. The difference in post-attitude was adjusted for pre-attitude differences. No differences in post-basketball skill were evidenced between groups. The higher skilled subjects, when grouped with lower skilled, experienced a substantial decrement in attitudes toward physical education. The implication, especially considering the future of mainstreaming, is that physical educators should plan units of instruction that provide some homogeneous environments for higher ability students.

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March 29, 1977
11:45 am

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